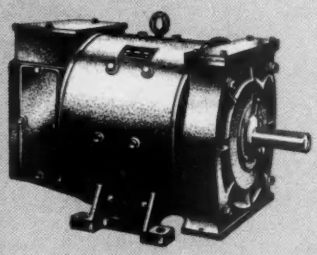
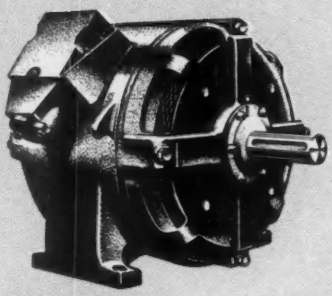
ELECTRICAL TIMES

THURSDAY
3 JULY
1952
NINEPENCE

They bear the name

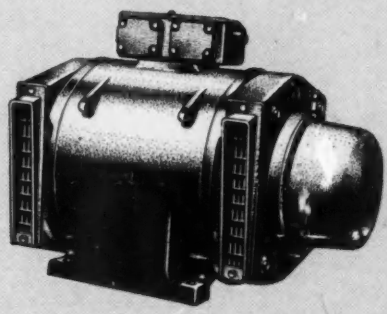


G.E.C.



...and a name

for RELIABILITY



G.E.C.

STANDARD INDUSTRIAL MOTORS

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

Creda
wash boiler

FROM STOCK

The 'C.80' looks so modern and attractive and holds so much! Look for these points: Complies fully with BSS 1326 : 1949 — Rust-proofed steel body, finished in corrosion-resistant cream enamel (mottled grey to order) with black stoved enamel plinth—Hinged aluminium lid—Ten gallons of water will boil quickly in the copper tub—Elements are arranged in two unequal circuits controlled by D.P. switches (for D.C. supplies S.P. switches can be fitted at no extra cost)—Competitive price

DIMENSIONS:
26¼" high, 19¼" diameter.

Write for leaflet

MADE BY THE HOUSE OF **Simplex**

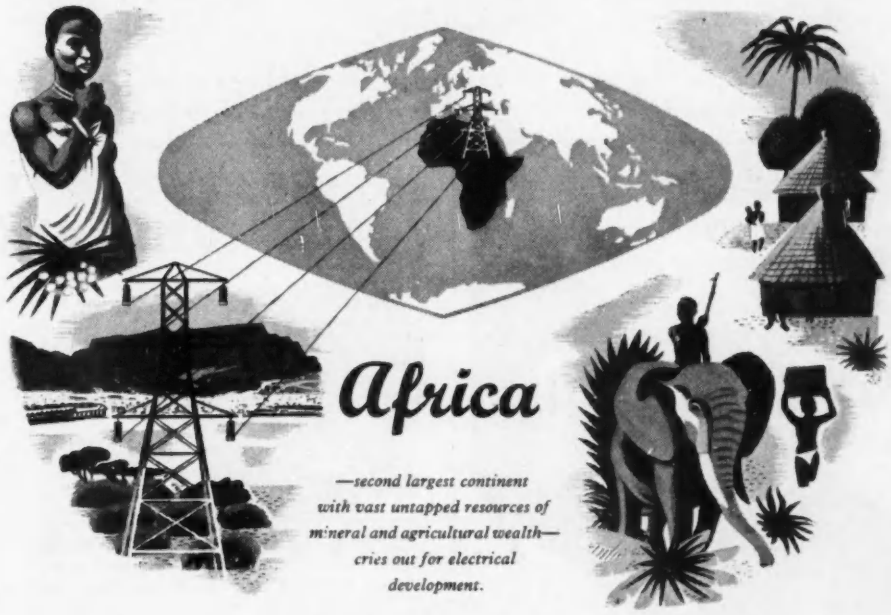
Simplex Electric Company Limited
Creda Works Blythe Bridge Staffs

A TI COMPANY

AWCO

Aluminium conductor spans the world

Industrial progress and the mechanisation of agriculture are vital needs in a world of ever-increasing population, and where there is a desperate shortage of foodstuffs. Essential to these ends is the widespread provision of electrical power. Water power and other readily convertible sources of electricity are useless without the means of distribution. Aluminium conductors bridge the gap, by high tension grids spanning continents, feeder networks to factories, villages and townships and low voltage house supply lines. With aluminium, the electrification of the world becomes possible.


Africa
—second largest continent with vast untapped resources of mineral and agricultural wealth—cries out for electrical development.

ALUMINIUM WIRE & CABLE CO. LTD.

HEAD OFFICE AND WORKS: PORT TENNANT, SWANSEA, GLAMORGAN
SALES OFFICE: 37 THURLOE STREET, SOUTH KENSINGTON, LONDON, S.W.7
TELEPHONE: KNIGHTSBRIDGE 1721/4

210/61A

A

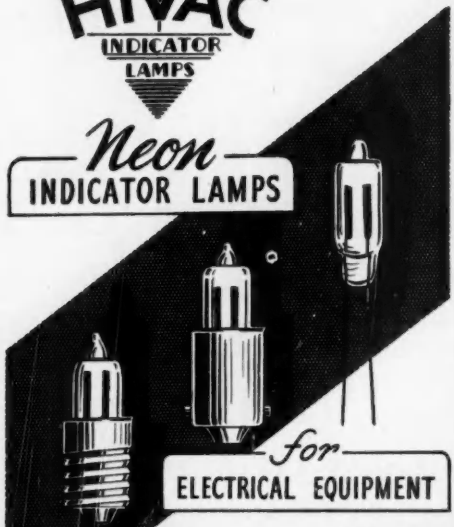
IF IT'S CYLINDERS
FOR PNEUMATIC CONTROL
The standard of quality is second-to-none. Made entirely from non-corrodible metals, including stainless steel. A series of cylinders up to 12 in. bore, including single, double acting, and double impulse types with a wide variety or alterrative mountings available, such as neck, flange, foot and trunnion. Supplied with strokes to suit all requirements.
CALL IN
LANG PNEUMATIC
Limited

W'HAMPTON 23333 24994 'Grams: W'HAMPTON 23333

LANG PNEUMATIC LTD., VICTORY WORKS, BIRMINGHAM RD., WOLVERHAMPTON

HIVAC
INDICATOR LAMPS

Neon
INDICATOR LAMPS



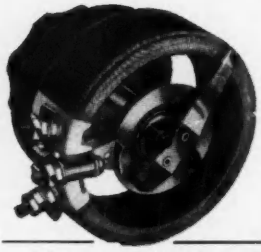
for
ELECTRICAL EQUIPMENT

ACTUAL SIZE

Hivac Ltd

GREENHILL CRESCENT, HARROW-ON-THE-HILL
MIDDLESEX *Telephone: HARrow 2655*

TOROIDAL WOUND POTENTIOMETERS



Efficient and Reliable, these instruments are second to none. Our Technical service will be happy to advise you in any difficulty, so do not hesitate to get in touch with us soon.

CRESSALL

Registered Trade Name of

THE CRESSALL MANUFACTURING CO. LTD
Tower Street, Birmingham 19
Telephone: ASTon Cross 2666 (3 lines)
Telegrams: "OHMIC Birmingham"

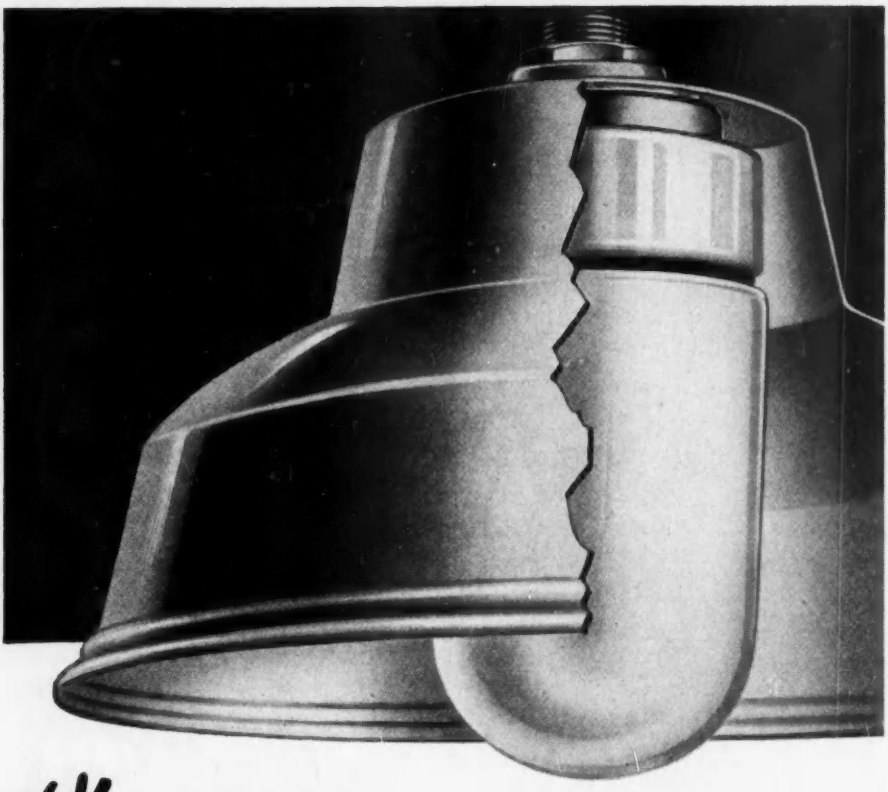
Pointers to Perfection

"Just perfect" — that's how the housewife speaks of her electric kitchen. And though she doesn't know it, the dependable performance of her electric stove, kettle, washer and vacuum cleaner is very largely due to **ASHTON** Cables and Flexibles which connect them into the mains supply.

Ashton Cables, laboratory tested at every stage of their manufacture, have been proved to be completely efficient and reliable under the most exacting conditions. They are available in various forms for every electrical need.

ASHTON
Cables
FOR HOME AND INDUSTRY

AERIALITE LTD., STALYBRIDGE, CHESHIRE

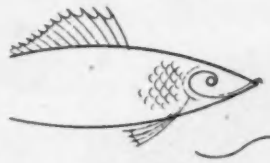


When R.E.A.L. say HEAVY DUTY...!

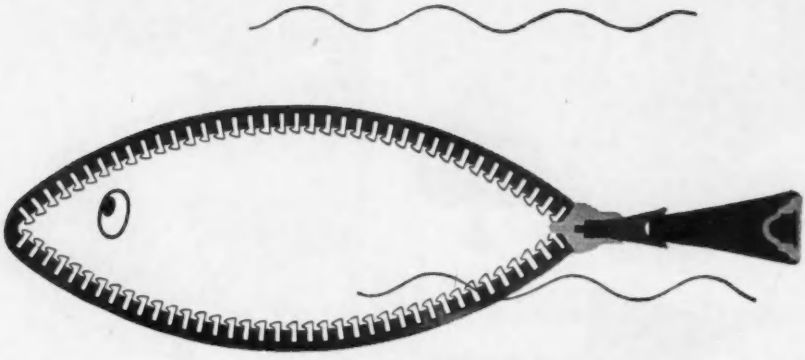
60, 100 and 200 watt fittings. Also with Angle-Concentrating Reflectors. Choice of Clear Glass or Crystalux Screw-neck Globes. SEND FOR LEAFLET P.9512.

This R.E.A.L. Heavy Duty fitting is typically tough! Watertight and non-corrodible, the R.E.A.L. patent one-piece porcelain body, and the screw-neck glass globe, are protected by the 'overall' formation of the reflector, while the entire weight of the unit is carried by the aluminium die-cast top-member.

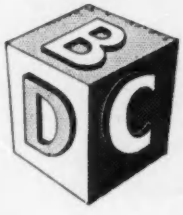
Issued by Rowlands Electrical Accessories Ltd., R.E.A.L. Works, Birmingham, 18.



why pick on us?



Because we can undertake big pressure die castings up to 23 lb., and a projected area of 400 sq. ins. in Mazak, and up to 9 lb., and a projected area of 130 sq. ins. in Aluminium, or tiddlers as small as the smallest slider of a zip fastener.



the whole in one

BRITISH DIE CASTING AND ENGINEERING CO. LTD.
PEMBROKE WORKS · PEMBROKE ROAD · LONDON, N.10. Tel: Tudor 2594-5-6

WEST CHIRTON TRADING ESTATE · NORTH SHIELDS · NORTHUMBERLAND. NORTH SHIELDS 2100

CRC 19

IN EVERY TYPE OF WINDING WIRE

The "Lewcos" range of products covers all known types including Cotton, Silk, Rayon, Enamel, Lewmex, Glass, Asbestos and combined coverings.

Write for leaflets giving full information and technical data.

THE LONDON ELECTRIC WIRE COMPANY AND SMITHS, LIMITED
Church Road, Leyton, London, E.10

Incorporating FREDERICK SMITH AND COMPANY
Associated with THE LIVERPOOL ELECTRIC CABLE COMPANY LIMITED, AND VACTITE WIRE COMPANY LIMITED

Fractional Horsepower Motors

Induction Motors

⅙ H.P. to 1 H.P.

General purpose motors of the ventilated drip-proof pattern for direct starting by double-pole switch—built to exert well above full-load torque at starting—with an exceptional range of alternative mountings, as illustrated.

CONSTRUCTION : these machines are compact and sturdily built ; the cores are built up of high grade, low-loss, insulated magnetic-steel laminations. The rotors are of cast aluminium, and are virtually indestructible in service.

BEARINGS : sleeve bearings for horizontal mounting and where ultra-quiet operation is required ; ball bearings for fixing horizontally, vertically, or at any angle.

These motors comply fully with BS. 170.

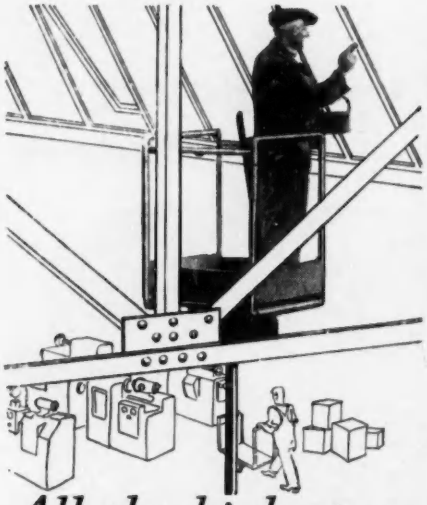
No manufacturer can offer a wider choice in fractional horsepower motors. Whatever the conditions of service or type of drive, there is a BTH motor well suited to the job.

BRITISH THOMSON-HOUSTON

THE BRITISH THOMSON-HOUSTON CO., LTD., RUGBY, ENGLAND

A3988

Member of the AEI group of companies



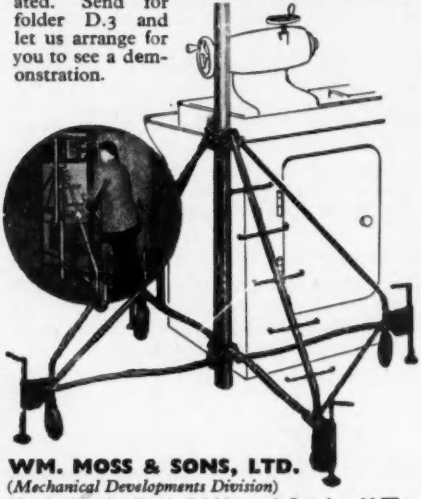
All the high spots
—in a jiffy!

with the

BEANSTALK
Regd.

MOBILE HYDRAULIC WORKING PLATFORM

Supersedes timber towers, ladders, trestles, scaffolding. Gives close access to all overhead work—legs span fixed objects. Folds to pass through doorways, narrow gangways and into lifts. Manually or electrically operated. Send for folder D.3 and let us arrange for you to see a demonstration.



WM. MOSS & SONS, LTD.
(Mechanical Developments Division)
North Circular Road, Cricklewood, London N.W.2
Tel.: GLAdstone 8080

T.A.4270

"THE FLUXITE QUINS" AT WORK

"FLUXITE, blow-lamp and brush.
Solder and iron!
What's the rush?
Something queer here."
Said EE, "No fear,
Just something very hush-hush."

For all SOLDERING WORK—you need FLUXITE—the paste flux—with which even dirty metals are soldered and "tinned". For the jointing of lead—without solder; and the "running" of white metal bearings—without "tinning" the bearing. It is suitable for ALL METALS—excepting ALUMINIUM.
With Fluxite, joints can be "wiped" successfully that are *impossible by any other method.*

Used for over 40 years in Government works and by leading Engineers and Manufacturers. OF ALL IRONMONGERS in tins—from 1/- upwards.

THE FLUXITE GUN puts FLUXITE where you want it by a simple pressure. Price 2/6 or filled 3/6.

FLUXITE
SIMPLIFIES *ALL* SOLDERING

Write for leaflets on case hardening steel and tempering tools with FLUXITE, also on "wiped" joints. Price 1½d. each
FLUXITE LTD. (Dept. E.T.) Bermondsey St., S.E.

He always said...

"No one will see it when the floor-boards are down."

* *Inspired by the well known "Yachting World" aphorisms appositely modified by*

SANDERS
WEDNESBURY

Good enough to power your product

The reputation of your machine or appliance depends largely on its "fractional" motor. Be sure of its reliability by choosing one of the Crompton Parkinson range. These are the motors which have the 'Marathon' bearings filled with enough oil for two years' non-stop running, dynamically balanced rotors, impregnation that keeps windings rock-hard in all conditions and a host of other advanced features for long life.

ELECTRICAL EQUIPMENT

Crompton Parkinson LIMITED

CROMPTON HOUSE, ALDWYCH, LONDON, W.C.2.

Phone: CHAncery 3333 Grams: Crompark, Estrand, London.

In the light of experience...

When you know that most of the best-known national names in every branch of industry and commerce have shown an overwhelming preference for Benjamin Lighting Equipment, which carries an equally well-known national name, you do not need to wonder which reflectors would suit you best. Whatever form of lighting you have in mind, remember, it is

Better by

BENJAMIN REGD.

THE BENJAMIN ELECTRIC LTD

(*Established* 1908)

Brantwood Road, Tottenham, London, N.17

Telephone : Tottenham 5252 (5 *lines*)
Telegrams : ' Benjalect, Southtot, London.'

BIRMINGHAM
5, Corporation St., Birmingham, 2.
Midland 5197

LEEDS
49, Basinghall St., Leeds, 1.
Leeds 25579

B.E.A. LONDON ENGINEERS USE "MEGGER" EARTH TESTERS

Routine Tests on Earthing of Metal Pylons

A B.E.A. engineer using a "Megger" Earth Tester, Series 2, to test the earthing efficiency of a pylon.

Engineers of the London Division of the British Electricity Authority use "Megger" Earth Testers to test the efficiency of earthing on recently erected metal pylons.

This is only one of the many uses to which they, and engineers and electricians everywhere, put this famous earth tester. For instance, periodical tests are made to ensure that the initial low resistance of the pylon to earth is maintained.

Another use to which the Authority puts the "Megger" Earth Tester is for testing soil resistivity, as a guide to the location of new earth electrodes. In rural areas it is often employed for tests on pole transformers.

Evershed's have issued a handbook on earth testing which is an invaluable guide to the functions and versatility of the "Megger" Earth Tester. The handbook contains full details of how to make earth tests similar to those above, on your own apparatus.
Ask for Publication J.247.

LONG SERVICE IN BOMBAY

Nearly 7,000 miles away from London another Evershed instrument has given 20 years of good service and is still in use. This is a "Dionic" Water Purity Meter, fitted in the laboratory of the Great Indian Peninsular Railway's Kalyan Power House, Bombay.

The Meter is used by the Power House Chemist for checking conductivity of various samples of water and distillate. A second "Dionic" tester is permanently installed in the Turbine Room for checking continuously the conductivity of condensate from the condensers of the four turbines. The authorities state that any contamination of condensate by circulating water due to a condenser tube leaking even slightly has been brought to light immediately by this "Dionic" meter.

"Dionic" instruments provide an extremely simple means of detecting and measuring the amount of inorganic impurities dissolved in water and supersede to a large extent the chemical tests associated with this class of work.

Send for Publication J.216.

MEGGER
TRADE MARK

EVERSHED & VIGNOLES LIMITED
ACTON LANE WORKS · CHISWICK . LONDON W.4

Telephone: Chiswick 3670 *Telegrams: Megger, Chisk, London* · *Cables: Megger, London*

6/60
B

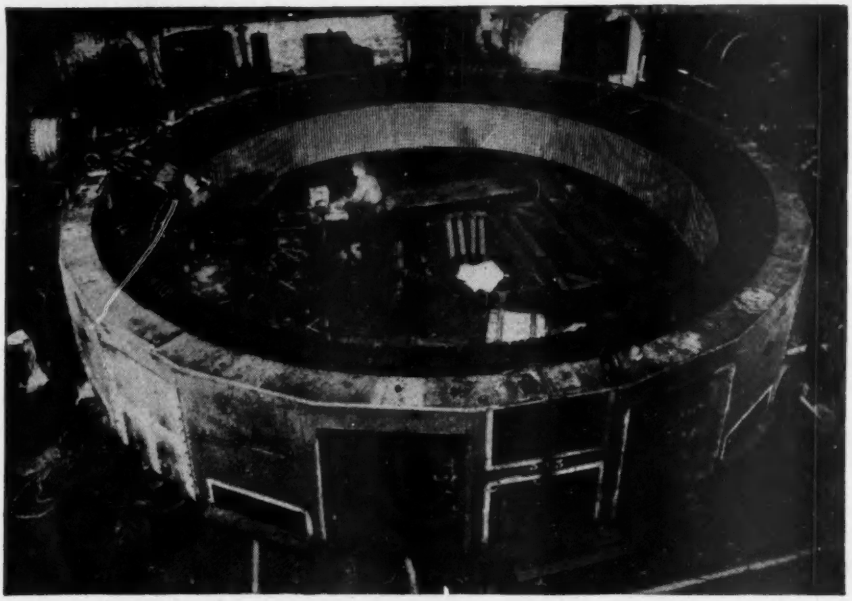


Photo: Courtesy Metropolitan Vickers Electrical Co. Ltd.

One of the three water-turbine driven generator stators—the largest so far built in this country—for a New Zealand power station. Each coil consists of a number of "Fibreglass" insulated copper strips in parallel.

FIBREGLASS

TRADE MARK

— for Electrical Insulation

Yarns, Tapes, Sleevings & Tying Cords

Experience has shown that substantial freedom from alkali is essential in glass textiles used for electrical insulation. " Fibreglass " yarn is substantially free from alkali and is **Electrical Insulation at its best.**

If insulation is destroyed, electrical equipment fails—valuable working hours are lost—important deliveries are delayed. The price of inferior insulation is a heavy one. Nothing but the best insulation available is good enough for your equipment. Since " Fibreglass " is made of glass, it is inorganic, acid resistant, and unaffected by corrosive fumes or heat—and since the glass is substantially free from alkali it is also unaffected by moisture.

Fibreglass Limited, Ravenhead, St. Helens, Lancs. (St. Helens 4224)

LONDON OFFICE: 63/65 Piccadilly, W.1 (Regent 2115/6) GLASGOW OFFICE: 136 Renfield Street (Douglas 2687) NEWCASTLE-ON-TYNE OFFICE: 16 Dean Street MANCHESTER OFFICE: 11 Piccadilly (Blackfriars 8863) DUBLIN OFFICE: 21 Merrion Square North (Dublin 66024) BIRMINGHAM OFFICE: Piccadilly Arcade, 105 New Street (Midland 0464/5)

ZEVA Electric SOLDERING TOOLS

FOR *Speed Economy Better Work*

The news that this famous range of Soldering Irons and Crucibles is again available has been welcomed in numerous branches of industry everywhere. Zeva Tools are unquestionably without equal for efficiency, economy and trouble-free long life.

- **ZEVA** heating elements never need renewal. They last the life of the tool.
- **ZEVA** Irons can be left switched on all day without detriment to the tool.
- **ZEVA** current consumption for rated temperature is less than any other make of tool.
- **ZEVA** initial cost is the only cost.
- **ZEVA** Irons are guaranteed.

Write for complete illustrated Catalogue

THE AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO. LTD.
WINDER HOUSE · DOUGLAS STREET · LONDON S.W.1 Telephone VICtoria 3404–9

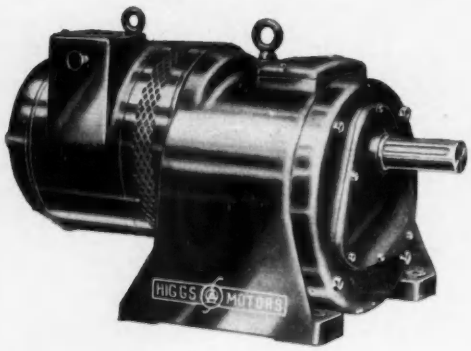
Z1/PO/ZWKS

TRADE MARK

HIGGS MOTORS LTD

CHAIRMAN WALTER F. HIGGS, M.I.E.E.

BIRMINGHAM 6 ENGLAND



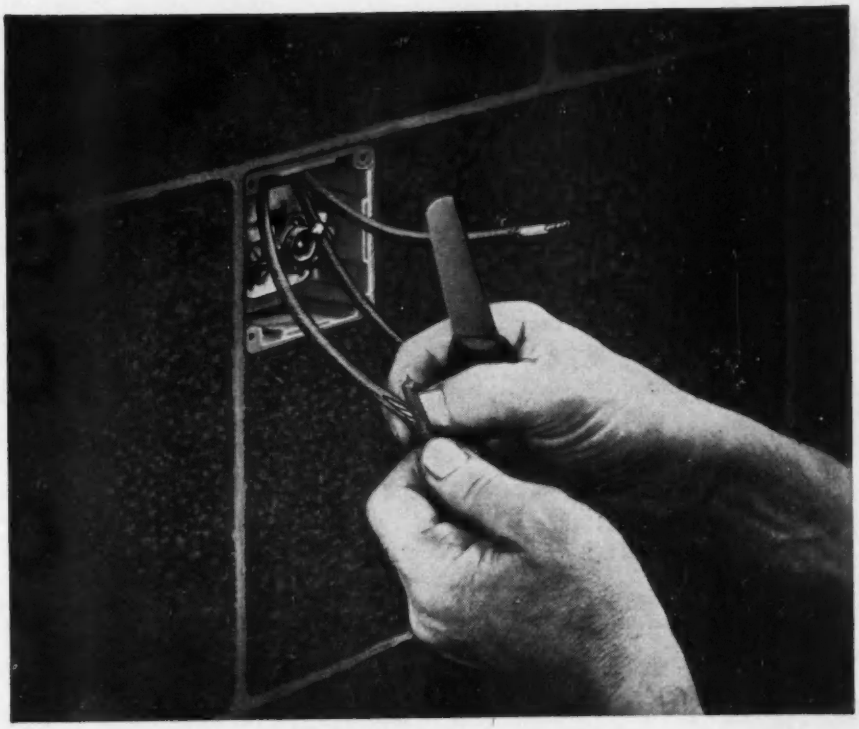
From ½ to 30 h.p.

From 9 r.p.m.

Select a Higgs unit for that slow speed drive.

GUARANTEED FOR EVER

Belfast, Birmingham, Bristol, Dundee, Glasgow, London, Manchester, Newcastle, Peterborough, Sheffield, Wolverhampton



Easy Stripping

There's nothing to beat BICC Rubber and Thermoplastic Insulated Cables for speedier installations.

They are popular among busy wiremen, for they are made to ensure fast clean stripping, saving valuable time — and tempers !

The best jobs are done with BICC Cables.

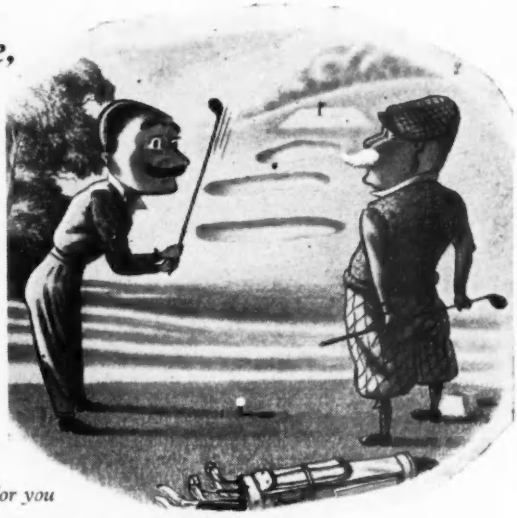
Complete details on the range and sizes of BICC Rubber and Thermoplastic Insulated Cables are available on request.

B.I. Callender's

RUBBER and THERMOPLASTIC CABLES

BRITISH INSULATED CALLENDER'S CABLES LIMITED
NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2

"You can do it in one, Mr. Ash"



"You think so, Mr. Downs?"

"I know it, Mr. Ash. Here was this customer using a transparent cover assembled from five cut sections . . ."

"And then, Mr. Downs?"

"He brought it to us. Although it was only 3¼ inches by 2 inches it was 3 inches deep and had a fine limit radius on two of the edges. We made it in one deep drawn operation from 'Perspex' sheet at a considerable saving in time, labour and material, Mr. Ash."*

"Really on the ball, Mr. Downs."

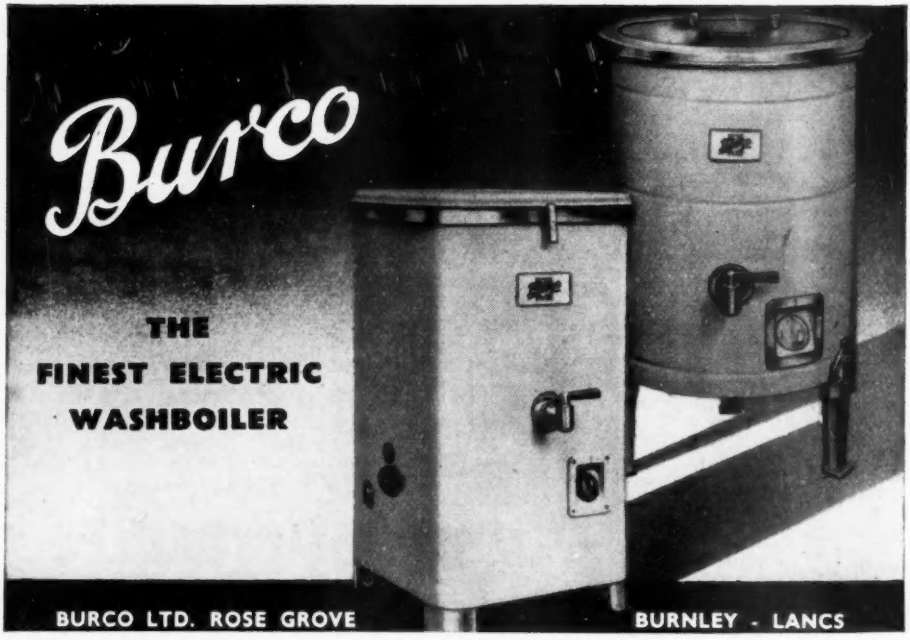
"As usual, Mr. Ash.

If you want to know what plastics can do for you

ask Ashdowns

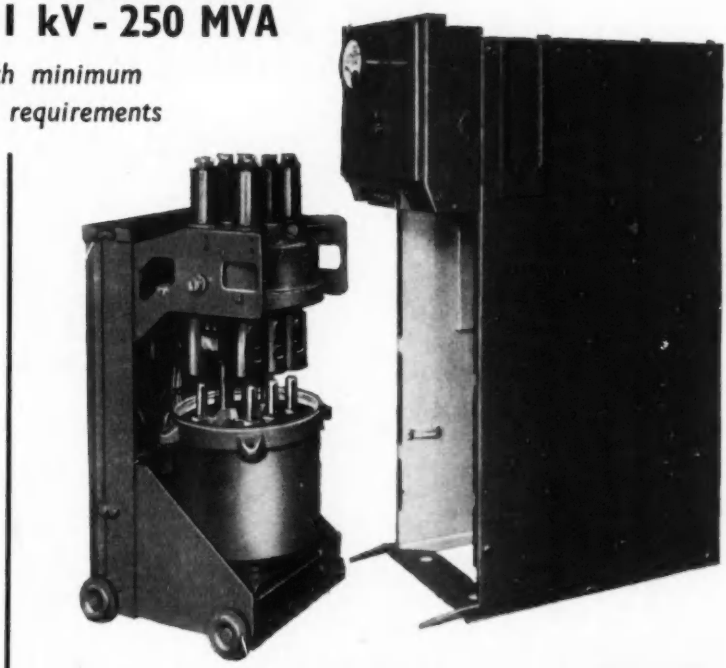
ASHDOWNS LIMITED, ECCLESTON WORKS. ST. HELENS, LANCASHIRE Phone : St. Helens 3206

Ashdowns Ltd. is a subsidiary of Pilkington Bros. Ltd. (* *Perspex is the registered trade mark of I.C.I. Ltd.*)



FOR H.V. DISTRIBUTION UP TO 11 kV - 250 MVA

with minimum space requirements



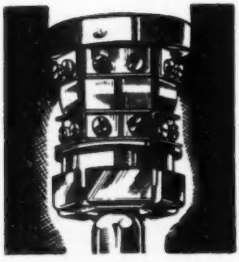
and **RELIABILITY IN SERVICE**

Innumerable short circuit tests prove the dependability of the **BV UNIT**

The 'FERGUSON PAILIN' BV unit is self-contained, of the metalclad type, giving adequate protection against fire risks, and designed for extension to similar or other, switch units and isolators as required.

Each circuit breaker is contained in its own truck, giving easy access for inspection or maintenance, and is interchangeable with other units where ratings and small wiring interconnections are identical.

Vertical isolation of the breaker ensures minimum space requirements of the unit, whilst adequate interlocks make opening and closing operations completely safe and prevent mal-operation.



The separate spring loaded segments of the fixed contact in an oil circuit breaker contact assembly (cross jet pot removed). This feature ensures perfect alignment when the lower contact moves into the closed position.
Full data gladly supplied on request

Performance proved — A.S.T.A. Certificated

FERGUSON PAILIN LTD.

MEMBER OF THE A.E.I. GROUP OF COMPANIES

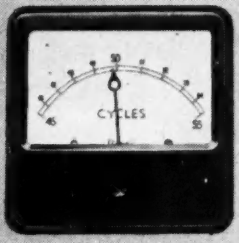
Switchgear Specialists

MANCHESTER, 11. ENGLAND

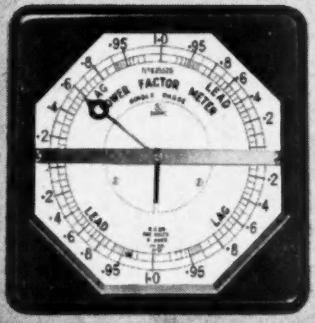
FERRANTI

SWITCHBOARD INSTRUMENTS

4 in. DYNAMOMETER WATTMETER



6 in. FREQUENCY METER



8 in. POWER FACTOR METER

SQUARE PATTERN *for* FLUSH MOUNTING

easy circular hole panel fixing

DIALS

4", 6" and 8"

Open or Protected

TYPES:

Moving coil and moving iron ammeters and voltmeters. Dynamometer Wattmeters. Power Factor Meters. Induction Wattmeters. Frequency Meters. Synchroscopes. Synchronous Clocks.

Round patterns, projecting or flush, also supplied in above sizes and types.

Write for general list IN.30. Lists on individual types supplied on request.

FERRANTI LTD · HOLLINWOOD · LANCS

London Office: KERN HOUSE, 36, KINGSWAY W.C.2

F 100

SPECIAL

Cables

C.M.A. MEMBERS WERE THE FIRST WITH :

The Co-Axial Cable for Television

Multi-Circuit Cable and Couplers giving greater mobility for Television Cameras and Apparatus.

Specially designed Cables for use in X-Ray Apparatus.

Multi-Circuit Telephone Cables for Audio and Carrier Wave Trunk lines.

MEMBERS OF THE C.M.A. & AFFILIATED MANUFACTURERS' ASSOCIATIONS

British Insulated Callender's Cables Ltd.
Connollys (Blackley) Ltd.
The Craigpark Electric Cable Co. Ltd.
Crompton Parkinson Ltd.
Enfield Cables Ltd.
The Edison Swan Electric Co. Ltd.
Greengate & Irwell Rubber Co. Ltd.
W. T. Glover & Company, Ltd.
W. T. Henley's Telegraph Works Co. Ltd.
Johnson & Phillips Ltd.
Liverpool Electric Cable Co. Ltd.
Metropolitan Electric Cable & Construction Company Ltd.
Pirelli-General Cable Works Ltd. (The General Electric Co. Ltd.)
Siemens Brothers & Co. Ltd. (Siemens Electric Lamps & Supplies Ltd.)
St. Helens Cable & Rubber Co. Ltd.
Standard Telephones & Cables Ltd.
The Telegraph Construction and Maintenance Co. Ltd.

CABLE MAKERS ASSOCIATION

52/54 HIGH HOLBORN, LONDON, W.C.I. TELEPHONE: HOLBORN 7633

Electrical Insulation

MICA

Washers
Plates
Commutator Segments
Stampings
Stove Plates
Heater Strips,
etc.

MICANITE

Mouldings, Commutator Vee Rings, Tubes, Covered Bars, Commutator Segments. Heater Strips. Sheet Material in Moulding, Flexible, Heat Resisting and Commutator Qualities, etc.

BAKELITE

Tubes
Bushes
Bobbins
Washers
Stampings
Panels
Covered Bars,
etc.

Manufactured by

EAST LONDON MICA WORKS

RINGWOOD ROAD, WALTHAMSTOW, LONDON, E.17

'Phone : KEYstone 4254 *Telegrams: Elmicmer, Easphone, London*

DEPENDABLE DELIVERY

EVERY DESCRIPTION OF ELECTRICAL MATERIAL FOR EVERY SITUATION

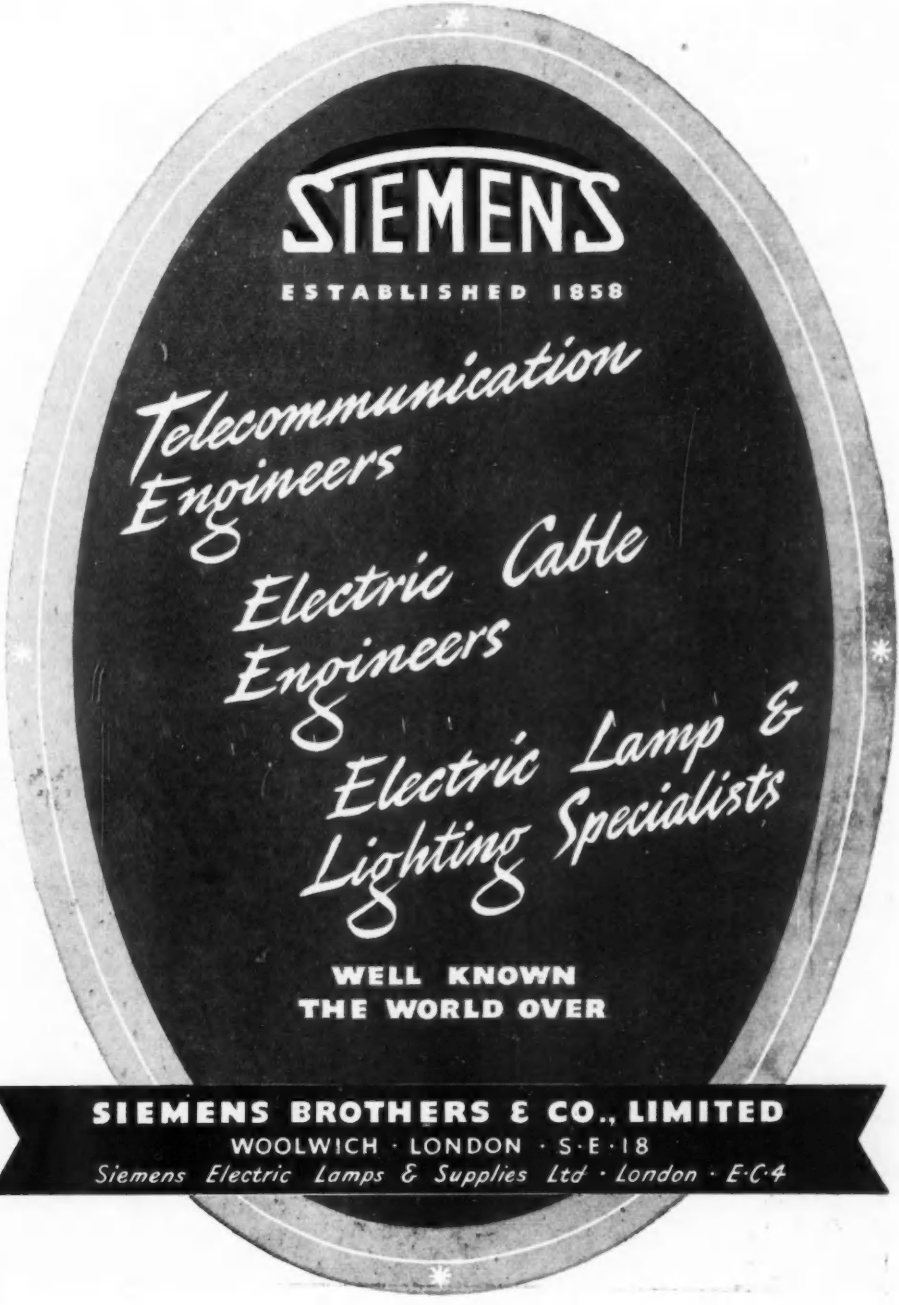
E·W·F ELECTRICAL WHOLESALERS FEDERATION MEMBER

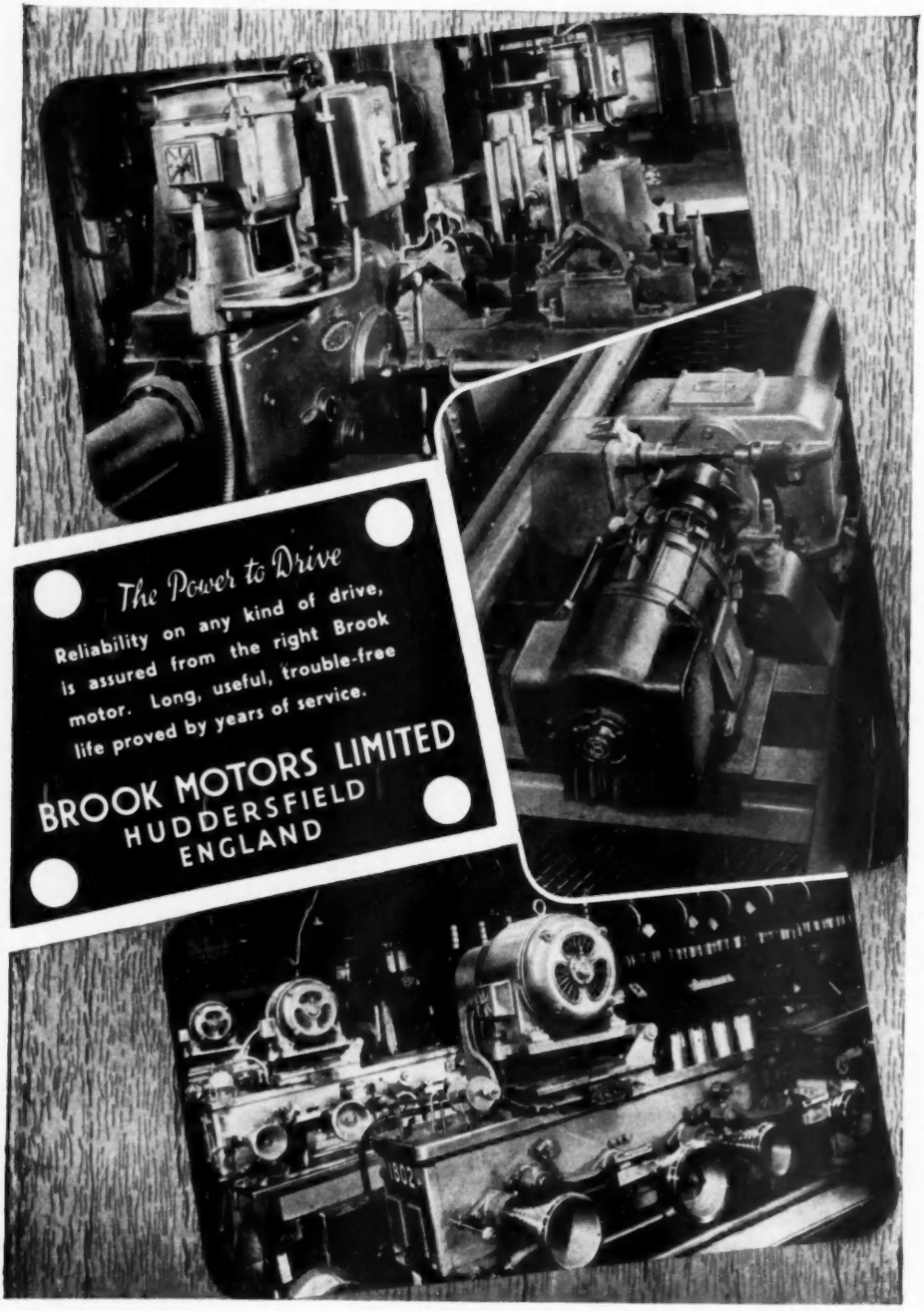
WE HANDLE HIGH-CLASS MATERIAL ONLY

OUR ADDRESSES:

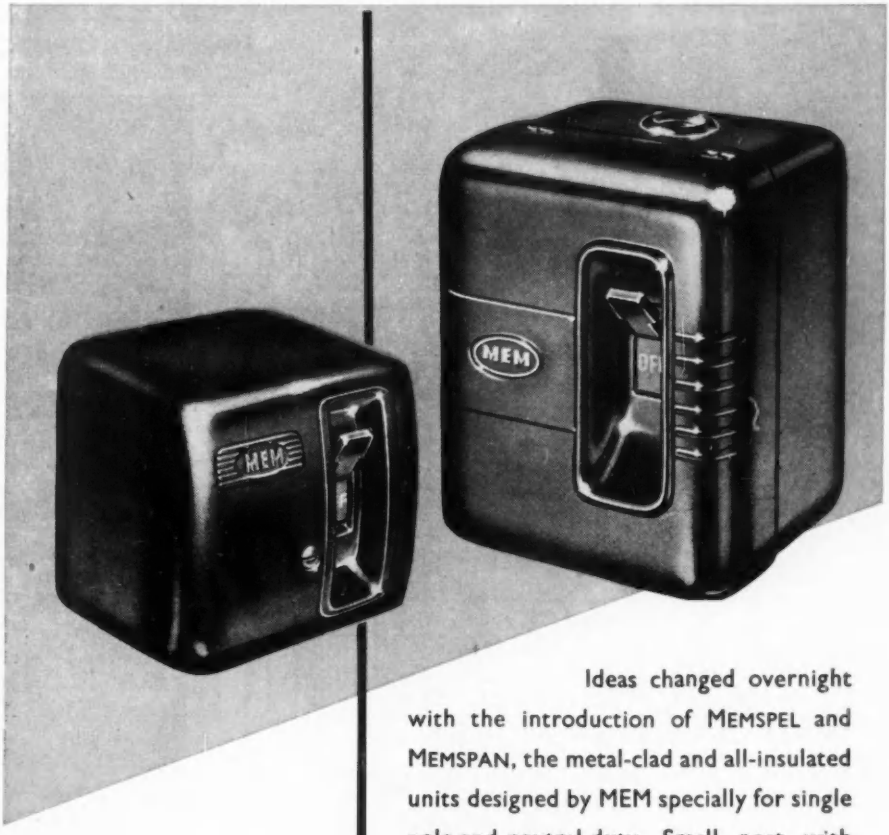
LIVERPOOL 1-9 Stanley St.
MANCHESTER 30 Pall Mall
CARLISLE Paternoster Row
BIRKENHEAD 94 Chester St.
WORKINGTON Oxford Buildings, Oxford Street

DOWNES & DAVIES LTD


SIEMENS
ESTABLISHED 1858
Telecommunication Engineers
Electric Cable Engineers
Electric Lamp & Lighting Specialists
WELL KNOWN
THE WORLD OVER
SIEMENS BROTHERS & CO., LIMITED
WOOLWICH · LONDON · S·E·18
Siemens Electric Lamps & Supplies Ltd · London · E·C·4


The Power to Drive
Reliability on any kind of drive, is assured from the right Brook motor. Long, useful, trouble-free life proved by years of service.
BROOK MOTORS LIMITED
HUDDERSFIELD
ENGLAND

I.L.C.219

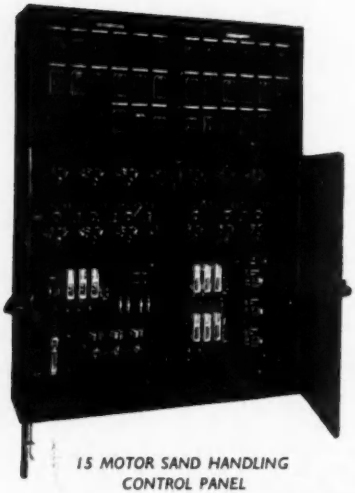


What shape is a switchfuse?

Ideas changed overnight with the introduction of MEMSPEL and MEMSPAN, the metal-clad and all-insulated units designed by MEM specially for single pole and neutral duty. Small, neat, with front operated slow break A.C. switch and choice of cartridge or rewirable fuses in interchangeable carriers, they set the style for today. Send for new Switchcraft Catalogue List No. 311.

MEM
Switch, fuse and motor control gear, electric fires and localised lighting equipment

MIDLAND ELECTRIC MANUFACTURING CO. LTD.
TYSELEY, BIRMINGHAM 11.
Branches in London and Manchester



15 MOTOR SAND HANDLING CONTROL PANEL

IGRANIC ELECTRIC CONTROL GEAR

FOR . . .

EFFICIENT PROTECTION

OF VALUABLE MACHINERY AND FOR RELIABILITY SPECIFY....

IGRANIC CONTROL

OUR DISTRICT OFFICE STAFFS OF SPECIALIST ENGINEERS ARE READILY AVAILABLE TO ADVISE YOU ON THE SELECTION OF CONTROL GEAR APPROPRIATE TO YOUR PARTICULAR NEEDS

SPECIALISED CONTROL EQUIPMENT FOR....

- AIR COMPRESSORS
- BLAST FURNACES
- CRANES AND TRANSPORTERS
- COAL HANDLING
- COKE OVENS
- FOUNDRIES
- LIFTS
- LAUNDRIES
- MACHINE TOOLS
- MOVING BRIDGES
- PAPER MILLS
- PRINTING MACHINERY
- PUMPS
- RUBBER MILLS
- REFRIGERATION PLANT
- STEEL MILLS
- SKIP HOISTS
- STONE GRADERS AND CONVEYORS
- SHIPS
- TEXTILE MACHINES
- WELDING MACHINES

MOTOR IGRANIC CONTROL

IGRANIC ELECTRIC CO., LTD.

HEAD OFFICE AND WORKS — BEDFORD

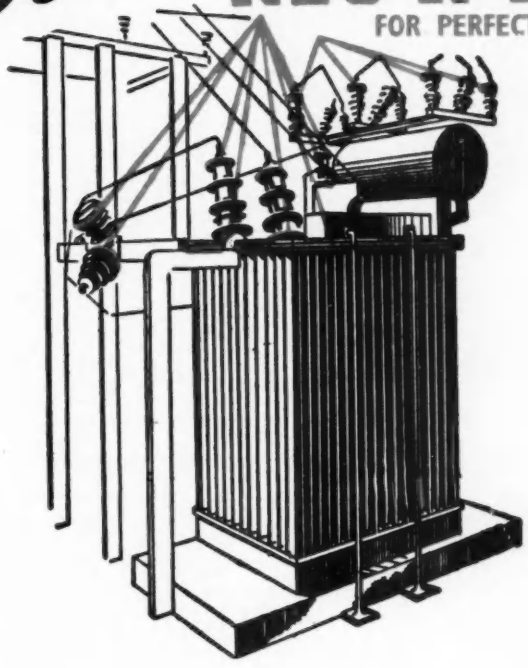
EXPORT DEPT. — VICTORIA STATION HOUSE, 191 VICTORIA STREET, LONDON, S.W.1

BRANCH OFFICES—LONDON · BIRMINGHAM · BRISTOL · CARDIFF · GLASGOW LEEDS · MANCHESTER · NEWCASTLE · SHEFFIELD

A Joint to forget Material to Remember

NEO-K-TEX

FOR PERFECT SEALING

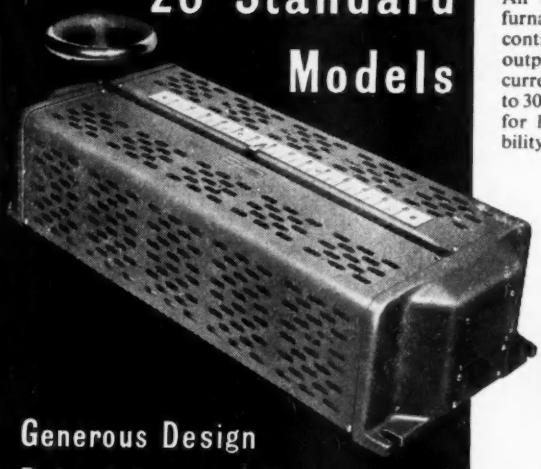


- **GASKETS**
- **WASHERS**
- **SHEETS**
- **MOULDINGS**

RESISTANT TO OIL, PETROL, WATER AND MOST INDUSTRIAL SOLVENTS

KAUTEX LTD. ELSTREE WAY ELSTREE HERTS *Tel.* ELSTREE 1777-8-9

26 Standard Models



Generous Design
Robust Construction
Rugged Self-lubricating Brushes

All types of A.C. apparatus — motors, furnaces, rectifiers, transformers — can be controlled by a single Regavolt whose output can be set, regardless of the load current, precisely at any voltage from 0 to 30% above the supply. Its rugged design for heavy industrial duty ensures reliability under severe working conditions.

Special designs can be made for incorporation in your own apparatus in addition to the wide range of single, 3 phase, hand and motor driven models listed in our catalogue No. 3121.

BERCO

REGAVOLT

REGULATING TRANSFORMER

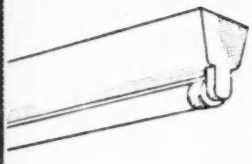
THE BRITISH ELECTRIC RESISTANCE CO. LTD.

Specialists in the control of current and voltage for more than 25 years.

Queensway Ponders End Middlesex
Phone: HOWard 1492 Grams: Vitrohm, Enfield

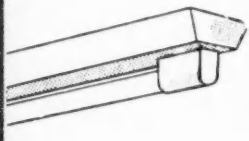
BR.3121

LOW-PRICED FLUORESCENT FITTINGS

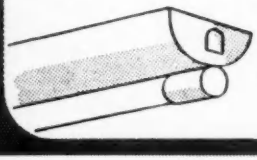


Type **DD 300**
3ft. BATTEN
Retail price:—
£3.12.6

also **DD 400**
4ft. BATTEN
£3.15.0

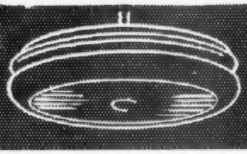


Type
DD 500
4ft. BATTEN
Retail price:—
£4.17.6



Type **18 R**
5ft. BATTEN
Retail price:—
£5.19.0

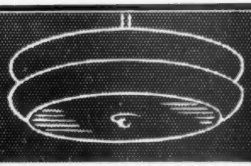
"Fluoradisc" 1001 £8.16.5



DRUBEL

DISTRIBUTORS LTD.

19-21 Stafford Rd., Croydon, *CRO 1107-8*



"Fluoradisc" 1005 £12.12.0

specify

Standard

rubber, plastic & textile
insulated

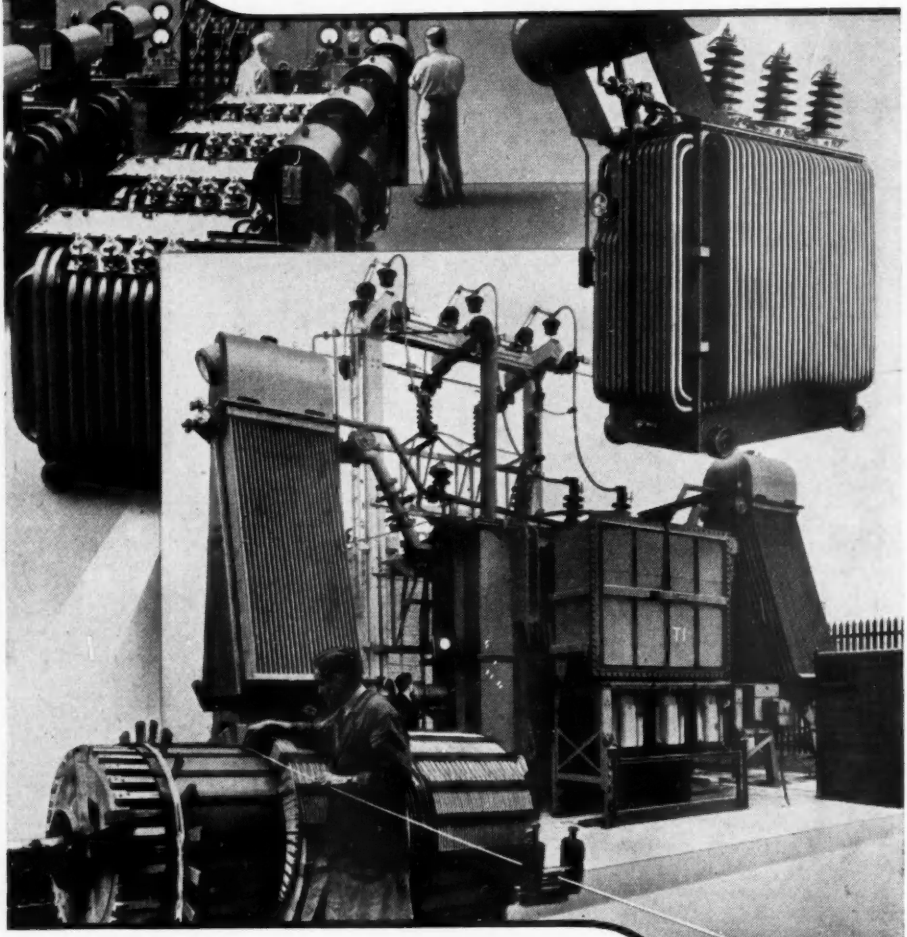
CABLES

Standard Telephones and Cables Limited

(Registered Office: Connaught House, Aldwych, London, W.C.2.)

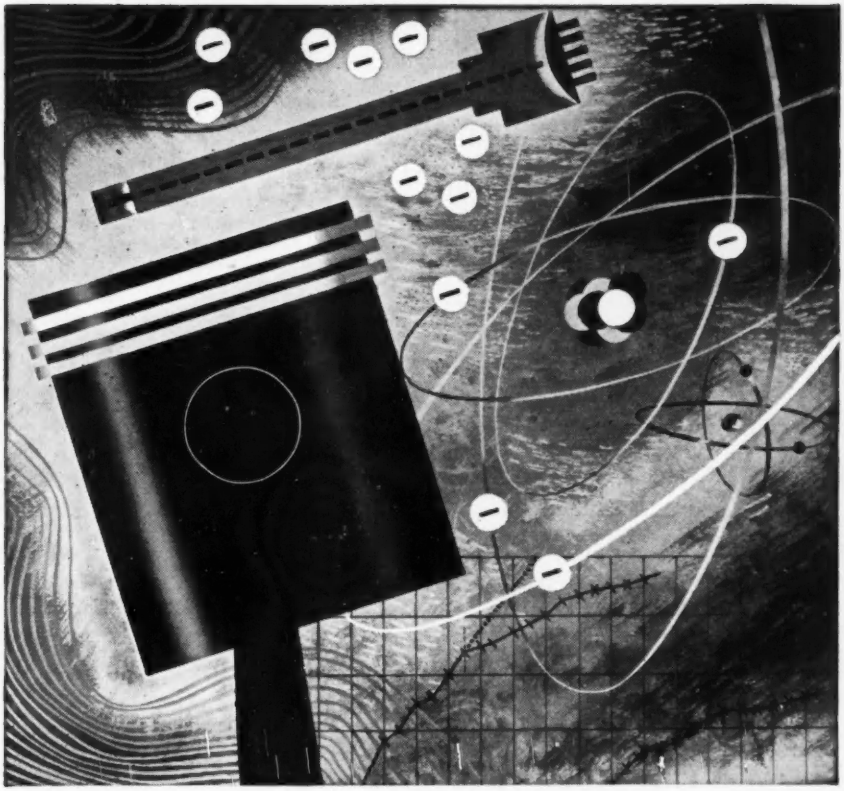
NEWPORT CABLES DIVISION: 48 North Row, Park Lane, London, W.1. MAYfair 4392
WORKS: Corporation Road, Newport, Monmouthshire. Newport 71381
REPRESENTATIVES & WAREHOUSES. Birmingham, Bristol, Dublin, Glasgow, London, Leeds, Liverpool, Manchester, Newcastle, Newport, Nottingham, Belfast, (A.W. Gordon, Ltd, Agent)

Up in a corner
or out in the open ...



the best answer is **BRUSH**

The Brush Electrical Engineering Co. Ltd., Loughborough, England *(A member of the BRUSH ABOE group)* 15·51
London, Birmingham, Cardiff, Manchester, Leeds, Newcastle, Glasgow, Bath, Sheffield, Dublin.



Atomic detectives

Metal wear is no new problem, but its study at Thornton has been transformed by the use of radioactive isotopes. These are the atomic detectives of science. They record the slightest fingerprint of wear.

In a test now proceeding, a radioactive piston ring fitted in an experimental engine is supplying valuable data on the *rate* of wear. Wear on the piston ring removes minute particles of radioactive metal which are carried away by the lubricating oil. As the oil returns to the sump of the engine it passes a Geiger Counter, which records the presence of radioactive metal.

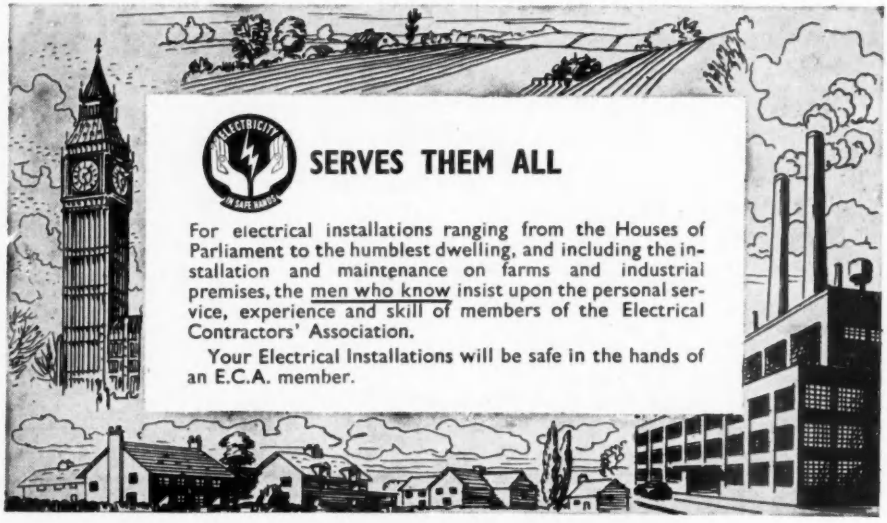
In another test, a length of wire is drawn vertically through a tungsten carbide die which has been made radioactive. Normally, the wear on the die using different wire-drawing lubricants is measurable only when about two miles of wire have been drawn, but with the aid of radioactive tracers, which are transferred from the die to the wire, the radioactivity of the wire can be assessed by means of a Geiger Counter. By this method it is possible to measure 0.00000002 grams of die wear per foot length of wire.

These are two examples of how work on the atom has given into the hands of Shell lubrication experts research aids that will give answers in weeks instead of years. To you that means even better performance from even better Shell lubricants. To industry it means a narrowing of the time-lag between the invention of new machines and the development of lubricants to suit them.

Shell's laboratories at Thornton, Cheshire, cover 800,000 square feet and are manned by a staff of over 800—that's how Shell makes sure.

SHELL

LEADERSHIP IN LUBRICATION



SERVES THEM ALL

For electrical installations ranging from the Houses of Parliament to the humblest dwelling, and including the installation and maintenance on farms and industrial premises, the men who know insist upon the personal service, experience and skill of members of the Electrical Contractors' Association.

Your Electrical Installations will be safe in the hands of an E.C.A. member.

For names and addresses of E.C.A. members in your area, write to the

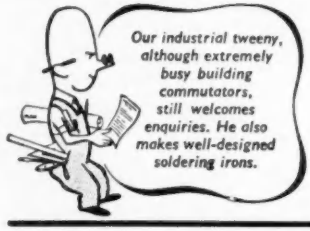
ELECTRICAL CONTRACTORS' ASSOCIATION (Inc)

14, BEDFORD ROW, LONDON, W.C.1.

Turning copper segments to fit cones for a commutator of ship's generator for M.V. "Kronprinsessan Margerets".

GRAngewood 4003 (4 lines)

When electrical equipment gives trouble is the time to 'phone Browning's. Now is the moment to note their number. Browning's have specialised in electrical repairs for over 30 years and they work for many "industrial giants" in all parts of the country. They really do understand your urgency for quick efficient work.


Our industrial tweeny, although extremely busy building commutators, still welcomes enquiries. He also makes well-designed soldering irons.

BROWNING'S ELECTRIC CO. LTD.

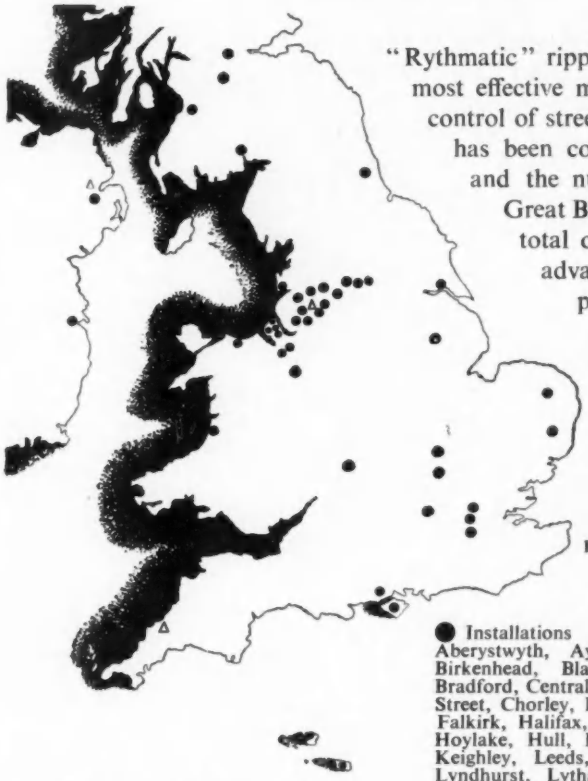
BOLEYN CASTLE · GREEN STREET
UPTON PARK · LONDON · E.13

TELEPHONE: GRANGEWOOD 4003 (4 lines)

The people who know most about ripple control —

SPECIFY RYTHMATIC ★

FOR STREET LIGHTING CONTROL



"Rythmatic" ripple control has proved the most effective method for the centralized control of street lighting. Its application has been continuous and widespread and the number of installations in Great Britain exceed the combined total of all other systems. The advantage of the "Rythmatic" principle is that a single frequency only provides the required number of signals. Injection equipment and control relays are simple in design, resulting in negligible maintenance requirements.

● Installations are already operating at Aberystwyth, Ayrshire, Banstead, Bedford, Birkenhead, Blackburn, Bletchley, Bolton, Bradford, Central London, Chester, Chester-le-Street, Chorley, Dublin, Dumfries, Dunstable, Falkirk, Halifax, Hawarden, High Wycombe, Hoylake, Hull, Isle of Wight, Jersey (C.I.), Keighley, Leeds, Leyton, Lincoln, Lisburn, Lyndhurst, Lytham St. Annes, Motherwell, Nelson, Newton-le-Willows, Norwich, Port Sunlight, Radcliffe, Rhyl, St. Helens, Wallasey, Wigan, Wolverton.

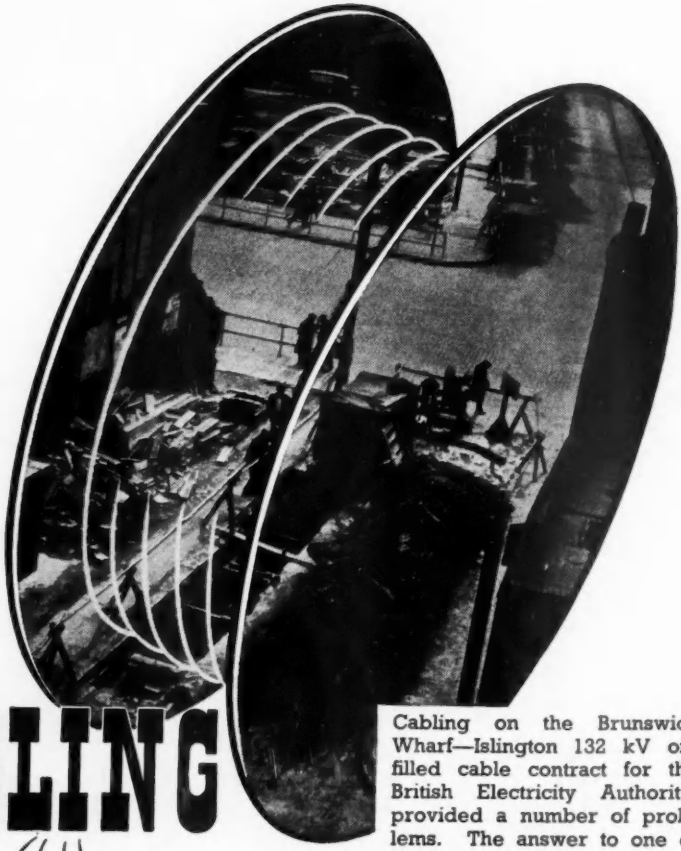
△ *In process of manufacture for Belfast, Rawtenstall and West Cornwall.*

AUTOMATIC TELEPHONE & ELECTRIC CO. LTD.

Strowger House, Arundel Street, London, W.C.2 Telephone: TEMple Bar 4506.
Telegrams: Strowger, Estrand, London. Strowger Works, Liverpool, 7.

★ 'RYTHMATIC' *is the registered trade mark of Automatic Telephone & Electric Co. Ltd.*

A.3523-CX23



CABLING by PG

Cabling on the Brunswick Wharf—Islington 132 kV oil-filled cable contract for the British Electricity Authority, provided a number of problems. The answer to one of them is illustrated. Many similar headings were driven under main roads to obviate traffic congestion. For this contract—over 70,000 yards of 132 kV oil-filled cable was supplied and installed.

Consulting Engineers:
Messrs. Merz & McLellan

OIL-FILLED SUPER TENSION CABLE

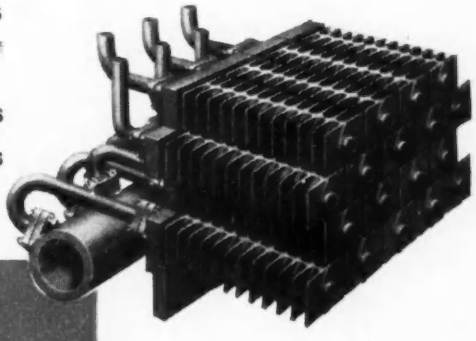
MANUFACTURERS OF EVERY KIND OF ELECTRIC CABLE

PIRELLI—GENERAL CABLE WORKS LTD., SOUTHAMPTON
(Associated Company of The General Electric Co., Ltd.)

Is there an economist in the house?

He will tell you that not only does a **Green's Economiser** on your boiler plant save fuel, but that it saves enough to extinguish its capital cost in a few years and thereafter pays a handsome dividend over its many years of useful life.

He will tell you that efficiency is high and maintenance costs low, because all parts have thorough access for inspection and are simple, robust and made of the best materials for the job. There are types to suit every boiler plant.



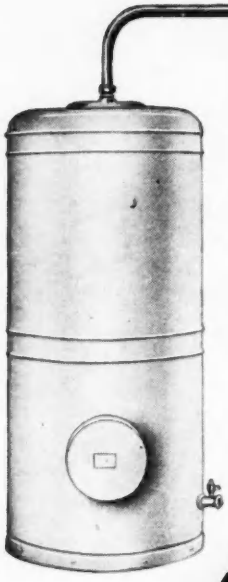
Green's Type 12 Premier Diamond Economiser, suitable for the highest working pressures. Available also in welded construction.

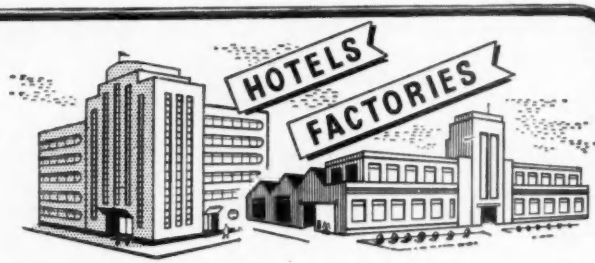
GREEN'S ECONOMISER

E. GREEN & SON LTD · WAKEFIELD · ENGLAND

Makers of economisers for more than one hundred years

GE93





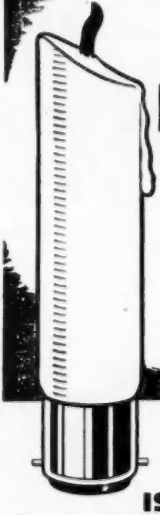
Wherever large quantities of hot water are required — install a "Dunlow" Electric Storage Tank

Heavy gauge copper construction, lagging protected by large steel casing or suitable for lagging on site. Kilowatt loading to meet requirements

DUNCAN LOW LIMITED
293 Bell Street, Glasgow C.4

"Dunlow"

THE LAMP THAT IS DIFFERENT



THE **ISMAY** ART CANDLE LAMP

Available in
25 Watt - White Opal
40 Watt - White Opal
or Colour Sprayed
Champagne, Red or Green
Standard Cap. B.C.
and S.B.C.

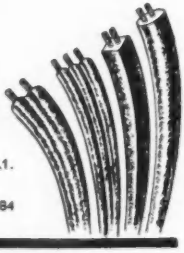
Patent No. 588801
Reg. Des. No. 866293/4

Manufactured by
ISMAY LAMPS LTD.
RODEN STREET WORKS, ILFORD, ESSEX
Telephone: Ilford 1153

When it's **Tenawire** *it's* **TROUBLE FREE**

Science brings a new high standard wiring in Tenawire. A high quality wire with outside covering which will not harden, split or crack. Really flexible yet tough, Tenawire is absolutely resistant to corrosion. Let our technical representative call and show you this important and unrivalled development.

TENAPLAS
(SALES) LIMITED
Southern Sales and Export:
24/25 Manchester Square, London, W.1.
Tel. Welbeck 7941.
Midland and Northern Sales Office:
181 Wollaton St., Nottingham. Tel. 43584



DO YOU KNOW

of a ceiling switch comparable with the **TEMCO** *at such a reasonable price ?*

The

TEMCO CEILING SWITCH

has

- ★ Q. M. & B. movement suitable for A.C. or D.C. and complies with B.S.816.
- ★ Moulded cover and porcelain base.
- ★ 2 ins. Fixing Centres yet exceptionally neat appearance.
- ★ Link chain insulated from switch mechanism.
- ★ 7 ft. cord.

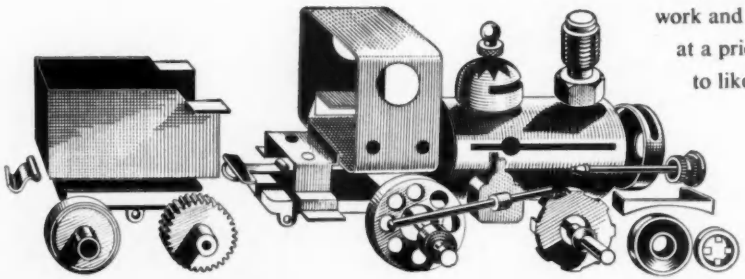
Each Switch is suitable for mounting on a wood block or iron box and can be operated from ceiling or wall. Available in 1 and 2 way brown on white, all brown or all white. Accessory Catalogue available on request.

T.M.C.-HARWELL (SALES) LTD

37 UPPER BERKELEY ST., LONDON, W.1 Tel: PADdington 1867-8-9

HIGH SPEED AUTOMATICS

Modern machinery and mass production methods give you top quality capstan and automatic work and sheet pressings at a price you are sure to like—and on time



GRIFFITHS, GILBART LLOYD & Co. Ltd.

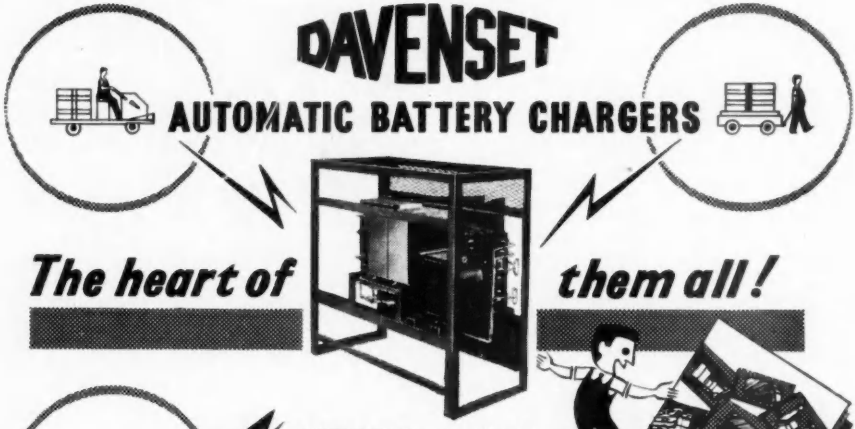
EMPIRE WORKS, PARK ROAD, BIRMINGHAM 18

Telephone: NORthern 2132/4

GGL

DAVENSET

AUTOMATIC BATTERY CHARGERS



The heart of them all!

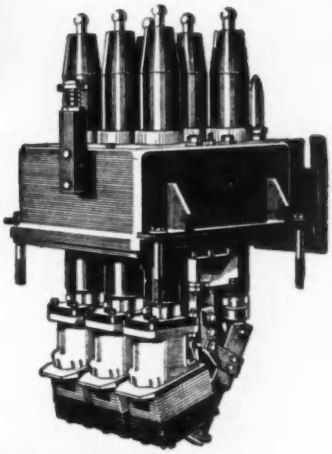
DAVENSET fully automatic selenium Battery Chargers for electric trucks, prams and road vehicles are manufactured at Davenset Works and sold all over the World.

There are models in the standard range for charging lead acid batteries of all types, capacities and voltages, available from stock. Chargers for alkaline batteries are supplied within a few months from receipt of orders.

Write for illustrated catalogue.

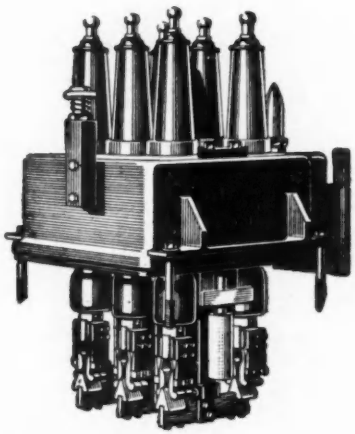
PARTRIDGE WILSON & CO. LTD. DAVENSET ELECTRICAL WORKS. LEICESTER. 5

INTERCHANGEABLE BREAKERS



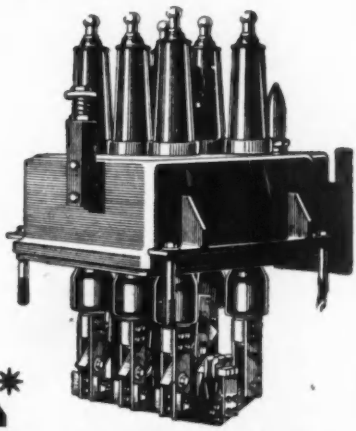
THE TRINAL
ARC-CONTROL BREAKER

250 MVA AT 6·6 AND 11kV (ASTA Certified)



THE TRINAL
PLAIN-BREAK BREAKER

150 MVA AT 6·6 AND 11 kV (ASTA Certified)



THE TRINAL OIL-SWITCH

TESTED TO B.S.116/1937—WITH ADDITIONAL
M-3-M TEST AT 250 MVA, 6·6 kV.

FORM THE J.&P. TRINAL* RANGE

—the latest advance in switchgear standardisation

* The "three-fold" range that can save you pounds and pounds through interchangeability. Full details in Publication SG 86

All three units are of similar dimensions and have common fixings. They can be accommodated in standard J. & P. metalclad, truck or cubicle housings all of which are rated at 250 MVA at 6·6 kV or 11 kV. Hence a board supplied for a system rated at 150 MVA can easily be converted on site to 250 MVA rating by the substitution of higher rated breakers.

JOHNSON & PHILLIPS LTD.
CHARLTON LONDON S.E.7

The mark that means that "little more" in quality

REGD. TRADE MARK
NIPHAN

WEATHERPROOF METAL-CLAD PLUGS, SOCKETS, SWITCH PLUGS, ETC. for all electrical purposes

5 300 amp. 250 500 volt.

Through Angle Socket with Cover and Plug
Plug
C.I. Terminal Socket & Cover with through sealing chamber and glands for cable
Plug
C.I. Switch Socket and Plug
Flange Socket and Cover

SIMMONDS & STOKES (NIPHAN) LTD

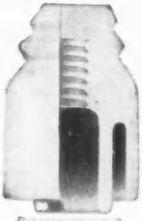
MANUFACTURING ELECTRICAL ENGINEERS

Victoria House, Southampton Row, London, W.C.1 · Holborn 8637 and 2163

OVERSEAS AGENTS: *S. AFRICA, Hubert Davies & Co., Ltd., Johannesburg. CEYLON, Walker & Greig, Ltd., Colombo. NEW ZEALAND, Samuel Brown, Ltd., Wellington. KENYA, R. W. Ketchley & Co., Nairobi, British East Africa.*

METWAY PRODUCTS
Regd. Trade Mark

600 LINES IN PORCELAIN ACCESSORIES



PIN OR LINE L.T. INSULATORS

REEL, BOBBIN AND SHACKLE INSULATORS

CLEATS FLAT OR MINING TYPE

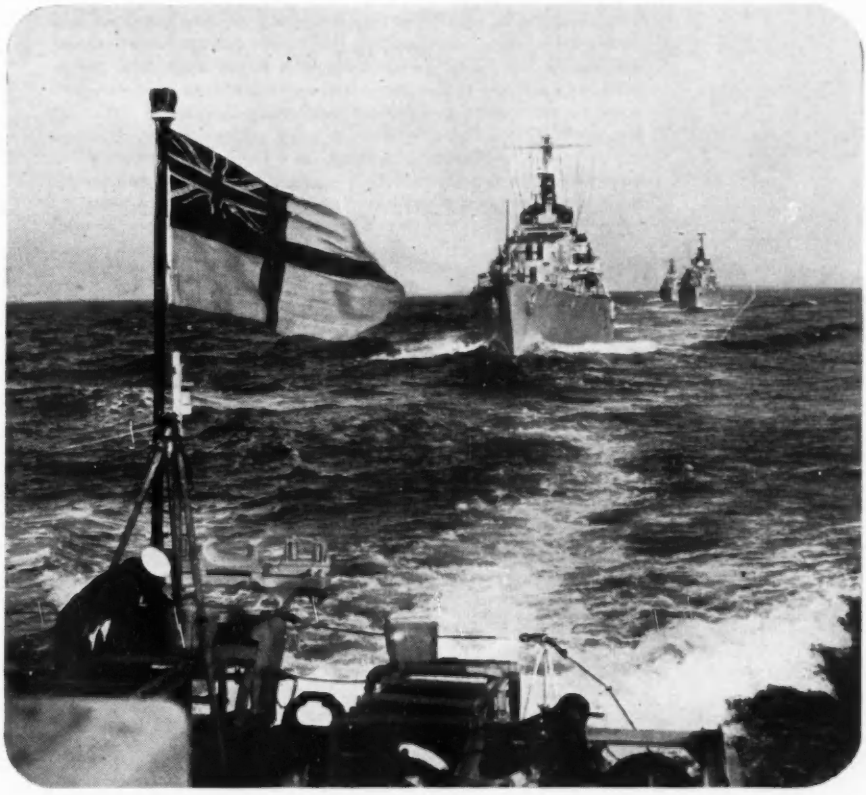
Ask for our **FULLY PRICED & ILLUSTRATED CATALOGUE No. AUF/2/TE**

METWAY ELECTRICAL INDUSTRIES LTD.

KING STREET, BRIGHTON, 1

Tel: Brighton 28366 Grams: Metway, Phone, Brighton

NATIONAL PRIDE



The White Ensign is one of the great traditional symbols of National pride—pride in technical achievement, in the skill of the craftsman and in the courage and endurance of the men who guard the oceans of the world.

National Corrugated Cases represent the highest achievement in the protection of Britain's products on their journeys to all parts of the world.

NATIONAL
CORRUGATED CASES

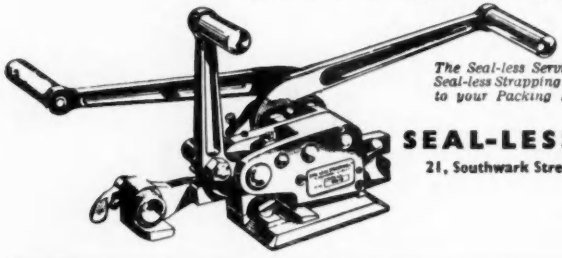
THE NATIONAL CORRUGATED PAPER COMPANY LTD · AYRES ROAD · OLD TRAFFORD · MANCHESTER

DIVISION OF THE Reed PAPER GROUP

Handling Notes
No. 2

SIMPLE STRAPPING

Essential to any modern factory is a secure system for packaging its goods, whether for transit over long distances or for distribution between factory departments. Seal-less Strapping is ideal for both these purposes. The Seal-less Strapping system, using high tensile steel strip, ensures complete protection and security. An important advantage of the system is the extreme simplicity of the tool which tensions, cuts and locks. This is easily used by a single operator; in a few seconds anyone can learn to use the Seal-less Strapping tool and use it swiftly and efficiently.
The Seal-less Strapping System can be demonstrated on your own packing floor. Seal-less saves the cost and trouble of using separate seals, and saves waste at the joint by dispensing with unnecessary overlaps and cut-offs.



The Seal-less Service is nation-wide. See for yourself how Seal-less Strapping brings extra security, speed and economy to your Packing Department. Write or telephone to :—

SEAL-LESS STRAPPING LTD.
21, Southwark Street, London, S.E.1. (Telephone No. HOP 4224)

REGISTERED M E C TRADE MARK

MUDIE

MEDIUM VOLTAGE CUBICLE SWITCHGEAR

For service up to 5000 amps at 600 Volts

MUDIE'S ELECTRICAL CO., LTD., BIRMINGHAM 28

'ENGLISH ELECTRIC'

h.r.c. fuse links

ASTA CERTIFIED

The Association of Short Circuit Testing Authorities (ASTA) issues Certificates of Rating for fuses giving satisfactory performance when tested in accordance with the appropriate clauses of British Standard 88.

The complete range of 'ENGLISH ELECTRIC' Type 'T' High Rupturing Capacity Non-Deteriorating Cartridge Fuse Links has been ASTA certified for Category of Duty 440AC4 to the 1939 edition of B.S.88 (the highest category at that time) and for Categories of Duty 440AC4 and 440AC5 representing 25 MVA and 35 MVA respectively to the 1947 edition of B.S.88.

RATING AMPS.	LIST NOS.	ASTA CERTIFICATE NUMBERS		
		B.S.88: 1939	B.S.88: 1947	
		440 AC 4	440 AC 4	440 AC 5
30	T1A30	617	1016	2074
60	T1S60	616	903	2022
100	TC100	615	932	2021
200	TF200	251	933	2033
300	TKF300	252	934	2032
400	TM400	629	935	2031
500	TT500	354	936	2025
800	TLT800	353	2098	2026

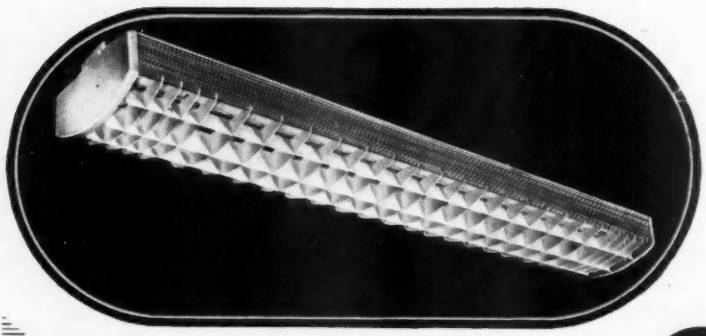
The ENGLISH ELECTRIC Company Limited

QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Fusegear Works: East Lancashire Road, Liverpool 10

Works: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

F.7



LOUVRED
COMMERCIAL FITTING
CAT. No. LF 25 TWIN-5ft. 80 WATT.

Our TECHNICAL SALES DEPT. is available to assist you in the preparation of COMPLETE LIGHTING SCHEMES incorporating the above or any of the well known Hi-Craft FLUORESCENT LIGHTING FITTINGS.

May we help you?

LF 25
£14·0·0
+ P.T.
£1·15·7

SB Hi-Craft FLUORESCENT LAMPS have a rated effective life of 5000 HOURS

Full details from:-

SMART & BROWN (ENGINEERS) LIMITED
TRADING ESTATE, SPENNYMOOR, Co DURHAM

PD

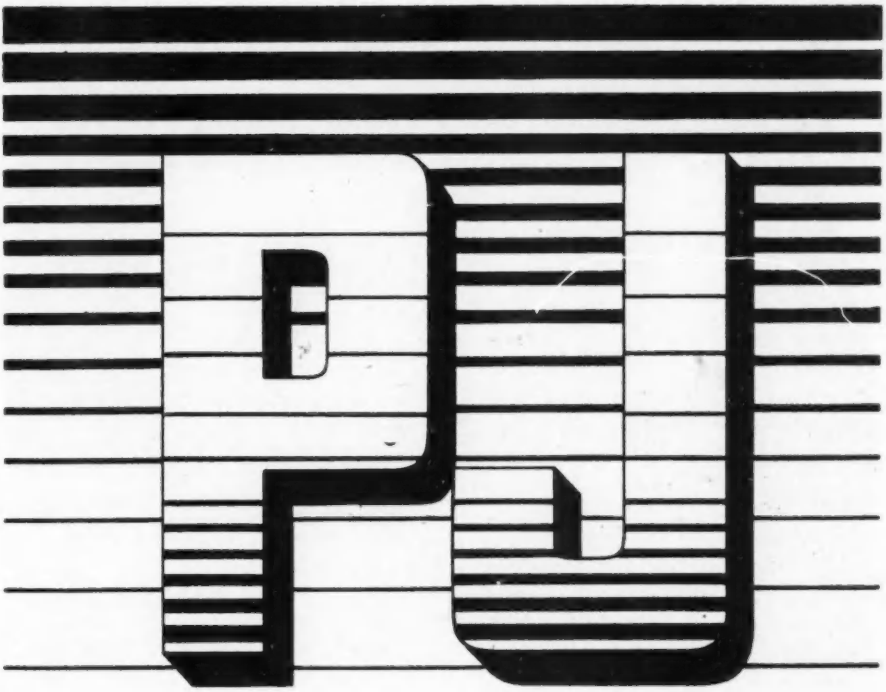
CARBON BRUSHES

Specify "P.D." brushes for electrical machines and apparatus of all types

Technical data on request to:—

POWELL DUFFRYN
CARBON PRODUCTS LTD
Electrical Carbons Division

SPRINGFIELD ROAD, HAYES, MIDDX. Telephone: HAYES 3994/8



Steel Sheets for the

Electrical Industries

PARTRIDGE, JONES & JOHN PATON LTD

PONTNEWYNYDD, NEAR PONTYPOOL

TELEPHONE PONTYPOOL 131/2

* THE OXFORD AND DISTRICT CO-OPERATIVE SOCIETY LTD.

why not join the list and specify

Photographs reproduced by courtesy of the Oxford and District Co-operative Society Ltd.

WESTINGHOUSE

WESTALITE VEHICLE CHARGERS

for your vehicles

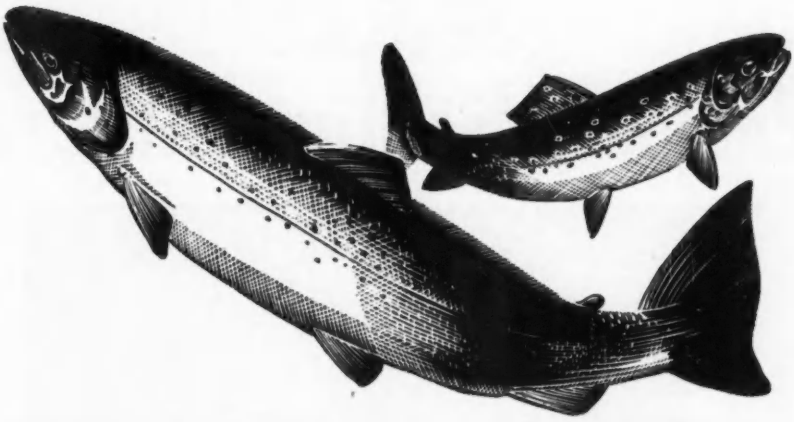
The Westinghouse charger type VZ is now a firmly established favourite with electric vehicle users where it has found a considerable and well satisfied market. Made in three convenient frame sizes, the range of outputs cover all requirements and the double-voltage Westalite rectifiers ensure a very high efficiency and a long life.

A recessed panel containing the meters, fuses and switches, reduces the possibility of breakages. Ease of maintenance, correct charging conditions for the battery and low running costs are a few of the many points that make the Westinghouse Westalite Vehicle Charger the best proposition.

For full details write for Publication M.R.11 to Dept. E.T. 13

WESTINGHOUSE BRAKE & SIGNAL CO. LTD.

82 York Way, King's Cross, London, N.1



Power from the Lochs . . . . Heather and rock and Gaelic and kilts and mist and rain and haggis and whusky and lochs and lochs and lochs . . . The power sleeping in these lochs is being nudged into wakefulness by the hydro-electric scheme; and from the rugged Highland scene comes electrical energy. Over moor and pasture, over crag and fell the power flows to turn the wheels of industry—power controlled and protected at many points by Reyrolle equipment.

REYROLLE

A. REYROLLE & CO. LTD., HEBBURN, CO. DURHAM.

PROTECTIVE GEAR

CRC 1PG

G.E.C.

Enclosed Sodium Lantern

for Side Road Lighting

This new lantern has been designed for side road lighting using a 45 watt or 60 watt OSRAM Sodium lamp. The lantern has an enlarged canopy to accommodate all the auxiliaries necessary to operate the lamp.

- Enlarged canopy providing a convenient and economical arrangement of housing the lamp operating gear where it is desired to make use of existing columns which may have no base accommodation for this.
- Optical system comprising specially designed "Perspex" refractor plates.
- Prismatic sides of refractors sealed on the inside of totally enclosing "Perspex" bowl.
- Smooth interior and exterior surfaces for ease of cleaning.
- Easy access to interior for cleaning and lamp renewal by quick release stainless steel toggle catches and hinged stainless steel supporting ring.
- Single piece die-cast aluminium alloy body supplied for top entry fixing.

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

ELECTRICAL TIMES

Vol. 122 No. 3165 THURSDAY, 3 JULY, 1952

PUBLISHED EVERY THURSDAY

SIXTY-FIRST YEAR OF PUBLICATION

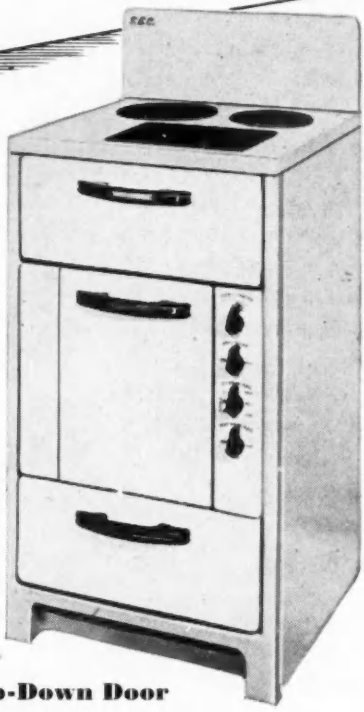
DESIGN OF MANUAL CONTROLS *by Bernard Gibbs* 3
PARIS-LONDON T.V. LINK 6
POWER FARMING AT THE ROYAL SHOW 7
THE END OF LONDON'S TRAMS 10
REPORT ON THE CABLE INDUSTRY 11
CONTRACTORS' CONFERENCE 13
GLASS LAMINATION USES INFRA-RED 14
BANKSIDE TAKES SHAPE 15
THE PRINCIPLE OF THE INDUCTION METER *by G. F. Tagg*, B.SC., PH.D., M.I.E.E., F.INST.P., FEL.A.I.E.E... 16
BRITISH STANDARDS 18
PROBLEMS AND PRACTICE IN ENGINEERING 19
I.E.E. SUMMER MEETING 21
STEEL PRODUCTION IN THE U.S. 22
"— THE KITCHEN FIT FOR A QUEEN" 23
OVERSEAS NEWS 24
PERSONALITIES IN THE INDUSTRY 26
NEW LITERATURE 28
THE BUYER'S COLUMN 29
E.R.A. REPORTS 31
THE WEEK IN NEWS 32
Questions in Parliament 36
Electric Supply News 38
Company Activities 39
COMMERCIAL INFORMATION 40
CLASSIFIED ADVERTISEMENTS 53
INDEX TO ADVERTISERS 60

SUBSCRIPTION RATES.—United Kingdom and Overseas £2 10s. 0d. per annum. Canada C$7·50c., U.S.A. $7·50c. per annum. Subscriptions are payable in advance and may commence with any issue throughout the year. Overseas subscriptions may be paid to The Electrical Times Limited by banker's draft, cheque or international money order. Single copies 9d. each

OFFICES — SARDINIA HOUSE, SARDINIA STREET, LONDON, W.C.2
Telephone - HOLborn 6016 Telegrams - Equivolt, Estrand, London

"Made by the G.E.C."

. . . an assurance of satisfaction



Features of the DC 114

★ In Two-Tone Ivory or Cream and Green

★ Finished in Acid-Resisting Vitreous Enamel

★ Extra large Oven Thermostatically Controlled

★ Sheathed-Wire Oven Elements

★ Counter Balanced Drop-Down Door

★ Cast Iron Front Frame and Hob

G.E.C. ELECTRIC COOKERS

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

Editorial

CABLES UNDER FIRE

THE Monopolies Commission report on wires and cables, published this week, is, if its recommendations are implemented, likely to be more far-reaching than that on electric lamps. Between the preparation of these two Reports, the White Paper on Resale Price Maintenance has been published, and unlike electric lamps, the Commission disapproves of common prices for covered wires and cables, except for some ineffective safeguards against undue price-cutting. It is felt that larger cables can be left to the B.E.A. to look after. The report acknowledges the improvement in the cable quality under the C.M.A. and the liberal patent licensing policy, but it goes far in its suggestions for alterations in the trading structure. We would like to ask whether the Commission gave the requisite consideration to the effects of their recommendations on the export trade of this major industry? The Report may be summed up as approving the continuance of all the beneficial effects of association while recommending the abolition of all those commercial factors which are the *raison d'etre* for association. Yet at the same time they tacitly assume continuance of those bodies for the implementation of some of their recommendations. Whatever may be the short-term results from the suggested changes, we feel that the Commission has not given adequate attention to possible long-term effects which may damage one of our best British industries.

TARIFFS AND UNITS

GROWTH is the natural condition of the supply industry. Despite periodic cries of "saturation," the demand for electric power has continued to increase, and the lessening rate of increase of sales, which has become apparent in the last few months, is only a temporary set-back; an instance of the industry's sensitivity as a barometer of business activity. Yet this falling off is significant in at least one long term respect. It gives the industry an opportunity of decreasing the gap between generating resources and demand which has existed since the war. As that gap narrows, the need to sell electricity becomes urgent. Mr. King, Chairman of the East Midlands Electricity Board has taken note of this changed sales environment with a statement to his consultative council. Last year his Board was for the first time faced with a serious deficit; one that has substantially reduced accumulated reserves. The pattern of demand that has existed since March suggests the possibility of a repetition during the current year. Yet the reaction of the Board has been not to increase tariffs directly, so as to cover any loss, but rather to hold the present position for as long as possible. Even the introduction of agreed standard tariffs is to be delayed, because of the possibility that the increased charges they impose might inhibit still further the growth of sales. This way lies the conscious establishment once more of a promotional policy, as a means of keeping the load factor high, a new experience indeed for the industry since nationalisation.

VOLUNTARY CHOICE

WITH the celebrations proper to fifty years of successful activity disposed of last year, the E.C.A. annual conference held early this week was able to give full attention to everyday affairs. From the president's review of his year of office, one particular point stands out: an early decision will have to be taken on the question of the registration of contractors and electricians, and the inspection of their work. The existing recommendations of the committee set up to organise a National Inspection Council are known to favour voluntary methods of securing the desired end, safety for the consumer. Equally certainly, the E.C.A. has always held that compulsion is the only practicable solution to this problem of shoddy work and spare-time

wire men. This view was reiterated by Mr. Watkins, though he made it clear that no irreversible decision has been taken, the matter being under consideration by a special committee of the Association's Council. It must be hoped that co-operation with the suggested voluntary scheme is eventually offered. However strong the arguments may be in favour of compulsion, there can be little likelihood of its being given the necessary legislative force at present. On the other hand, the voluntary system can only attain decisive success if it has the widespread and authoritative backing which the members of the E.C.A. can give.

METAL MELANGE

THOSE who have been hoping that the downward trend of non-ferrous metal prices in the past months would continue, had a sharp reminder that the period of shortages is far from over, by the rise, two weeks ago, of £50 a ton in the official copper price, which is now at a record level. Despite a steady increase in world production, current demand cannot be met, and the deficit may run still higher as defence production approaches its peak. The situation is confused by reason of the many varied world prices, official and otherwise, that are in operation which, although probably successful in preventing an even steeper rise, considerably becloud commercial trends. One lesson that post-war experience teaches, however, is the rapidity with which trends can change, particularly under the impact of political forces. Secondly, any sharp alteration in the position with regard to one metal brings secondary effects on other materials. The British price of lead has been raised by £8 a ton, but on the other hand, U.S. prices of zinc are weakening, consequent upon the steel strike in America. Thus in a world of allocations, official prices, stockpiling, price variations according to usage, special agreements and export-import margins, not to speak of overall production and consumption, it would be hazardous to attempt any forecast of the future trend of copper prices.

INFORMATION WANTED

DISTRICT heating projects, though they are so attractive at first sight, introduce engineering problems on which little information is available. The fact that several local authorities are seeking Parliamentary powers for the installation of such schemes gave the House of Commons the opportunity last week of enquiring the Government's opinion of these difficulties. It was stated that schemes so far sanctioned—eleven in all—are returning monthly reports which are being closely studied as regards thermal and financial efficiency. Though only one of the projects concerned is associated with a power station, the results of all of them will have a bearing on the practicability of further experiments of this type. Though no one scheme has been in operation sufficiently long for a full report to be prepared, experience gained so far is summarised in a memorandum shortly to be presented to the responsible Ministers. There seems, however, some doubt as to whether its contents will be made public. It must be strongly urged that they should be, for such operating data can be of the greatest assistance to the many engineers who have to consider the practicability of prospective schemes.

LONDON'S LOSS

LONDON'S trams are no more. This week ends a major phase in the development of electrical energy. For in those early days when electricity was struggling through the thorny hedge of legislation, electric traction was a brother in arms. Every phase of supply development, from rights over highways to nationalisation, has had its parallel in tramway development. Therefore, as a brother industry we must mourn its passing. As part of the obsequies, London Transport is issuing a souvenir ticket—a thoughtful idea—but the bald overprinting, "last tram week" sounds more like a festive occasion, than a tribute to a great past. But tramways are not dead. Elsewhere they are still progressing in this service to transport.

Meteor

Design of MANUAL CONTROLS

PHYSIOLOGICAL CONSIDERATIONS CAN LEAD TO IMPROVED OPERATOR EFFICIENCY —A THEME W. H. DUNKLEY INTRODUCES

by **BERNARD GIBBS***

THIS article directs attention to some anatomical and psychological knowledge which must influence the thoughts of engineers who are concerned with control and display.

The proprioceptive elements of the body, for example, form a system which may be new to engineers. It is that combination of neuro-muscular elements which enables me to say with my eyes shut—"my right thumb is now about one inch from my nose, and my right foot about six inches above the floor" and enables me to walk without watching my feet.

The point which this knowledge puts into the designer's mind must be the disposition of controls in such a way as to make the best use of the proprioceptive system, by arranging elements that have to be touched in sequence to come easily to hand without visual observation. It must be that the less strain one puts on this human faculty, the better will it serve its purposes of speed and accurate action.

The first reaction of the average engineer to the above statement and to a good many in Mr. Gibb's article will be "Why wrap up such obvious truths in such scientific verbosity? Most of what you say only adds up to a few statements that are horse sense."

The fact is that horse sense will never lead to an optimal combination of optimal details. It may bring a design of individual features that can hardly be improved on. But one cannot imagine enlightened commonsense, rule of thumb, or experienced opinion getting everything in an array as near perfect without, as with, the assistance of the scientific attack. The weapons and ideas available for the scientific attack are being laid before us in Mr. Gibb's articles. These are too few and too short to convey a conspectus of all the work that has been done on man-machine relations, or even all that has a bearing on a particular branch of engineering.

The purpose of these articles has been to bring to the notice of engineers the ways of approach to man-machine relations that have been very powerful in developing display and control work in a limited number of fields already.

Considering the state of mind of the operator it may be urged that there are two main aims in the design of man-machine relations: (1) On the display side—to design for alert-calm. (2) On the control (action) side—to design for confident speed. This article deals with factors influencing the second phase. It must be read not as a recipe for action so much as material for thought.—**W. H. Dunkley.**

MANUAL CONTROLS

MANY different forms of control levers, handwheels and foot pedals can be used to regulate the output of a machine, and they can be arranged in different positions and operational planes, so that the operator's movements and the muscle groups he uses may vary widely within the practicable limits of controller design.

These varying conditions can be evaluated, in terms of the operator's efficiency, by the methods described in previous articles. Experiments have been carried out, and data are available, to define the tolerance limits and optimal conditions, for many of the controls in common use. The criterion of efficiency generally adopted has been the accuracy of discrete point-to-point movement, or continuous tracking movements in following a moving index; but other studies have investigated human force and power limits, and the factors affecting fatigue. The available data must therefore be interpreted with the experimental criterion in mind, since the most accurate tracking control is certainly not the best for displacing large weights at maximum speed.

There are anatomical factors to be considered in controller design; and the muscle groups used, the height and working plane of the controls, have considerable effects on working efficiency. Comparatively straightforward tests

* *Mr. Gibbs is working with the Applied Psychology Research Unit of the Medical Research Unit at the Psychological Laboratory, Cambridge. Mr. W. H. Dunkley is with the Yorkshire Division, B.E.A.*

can define the relevant limits and optimal conditions. The problems are extremely complex, however, when the many different possible relationships between a unit movement of the control lever and the corresponding change in machine output are taken into account. There are such differences between the control characteristics of a lathe, where a unit control movement of the handwheel instantaneously alters the *position* of the tool, and those of a car, where a unit movement of the accelerator pedal alters vehicle *speed;* although an appreciable time must elapse before a new steady speed is reached. These control systems would be defined as "instantaneous positional" and "lagging velocity" respectively, and there are many different relationships of this kind in modern machines. The particular time/space relationship in use at a machine may greatly affect learning times, and the ultimate efficiency of the man/machine system, after full training of the operator.

Visual Signals

It is not easy to lay down hard and fast rules for the design of comparatively simple elements such as visual indicators; and it is still more difficult to do this when skilled movements are made in response to a visual signal. Many more variables are then introduced, and the action and interaction of different senses must be considered before any general principles of design can be determined.

Vision deals with the external environment; and the eye often acts as an "error pick-up" when instruments are read, and in many other industrial contexts. We can see the extent, direction and speed of the control movement that is required to correct any error in machine output, or to effect any desired change in the environment.

But more information than this is needed, before an effective movement can be organised by the higher motor centres in the brain. Movement cannot be organised without continuous knowledge of limb states, so that the most appropriate limbs and neuro-muscular units can be selected from those available, to subserve any given end.

A limb movement can be considered as the engineering problem of moving a mass radially about a universal joint, by means of elastic contractile tissues connected to opposite sides of the limb. One set of motor units must be contracted while the other lengthens in exact synchrony, and compensatory adjustments may be required in other limbs which are not directly involved in the movement. Experience shows that movements may be made at high speed and with fair precision, in conditions where vision alone cannot conceivably be regulating, and controlling in detail, the complex internal adjustments in the muscles. To serve this purpose, there are the proprioceptive nerve-endings in the muscles, tendons and joints.

Proprioceptors

The proprioceptors inform us of internal states and relationships such as limb position and movement. They have electro-mechanical characteristics which are very similar to the strain gauges of the engineer. Their electrical discharge is continuous, and the frequencies of discharge vary according to the tension on the muscle and its rate of stretch. The nerve endings are interconnected with the contractile motor units, in a manner which permits rapid and continuous selection of the most appropriate motor units; and the fine and continuous grading of their contraction or extension during movement. This information, dealing with internal states, is continuously transmitted to the brain, and is there integrated with the visual data, to permit organisation of the most effective voluntary action.

The visual signals are comparatively short-lived (i.e. they adapt rapidly to a stimulus, and the electrical discharge then ends), but the proprioceptive discharge adapts very slowly and forms a continuous though largely unconscious background for the short-lived visual signals. The two interacting systems may therefore define "what to do" (from the data of vision) and "how to do it" (from the data of the proprioceptive system). We can organise gross movements, of course, in the absence of one or another of the sensory systems, hence we can walk in the dark; and it is possible to walk by carefully watching the feet, if disease or injury partially destroys the proprioceptive systems. But both systems are generally necessary for rapid and finely graded movements, and there are a great many machines in use where the operator's performance is unnecessarily poor, and this may often be because the correct balance between the senses is not achieved, or because his working conditions do not permit the senses to operate at their maximum efficiency.

In visuo-motor skills, two main sensory streams of information are reaching the brain; where they must be integrated and analysed; and there is evidence to suggest that the brain, like other selecting and integrating devices, cannot exceed a certain working rate, so that the human operator can deal apparently with an average rate of five or six "bits" of informa-

tion per second. (A "bit" of information can be defined as the data required to decide between two simple alternative courses of action when both are equally likely to be needed and are held in equal readiness.) This analysis, or selecting time, is the main component in the familiar reaction time, i.e. the delay which occurs between the onset of a visual signal and the release of the appropriate muscular response; the time increasing as a logarithmic function of the number of separate "choices," or different alternative movements, which the operator must hold in readiness awaiting the visual signal. Thus, if only one light can shine, and this is always the signal to press only one key, then the operator will take about 0·2 sec. to react; but if a red light and a blue light are equally likely to shine, and to signal respectively for either a left-hand or right-hand key, then reaction time increases to more than 0·3 sec., with corresponding logarithmic increases for higher levels of choice.

Practical Implications

These psychological findings suggest practical implications for controller design, wherever the operator has to control a machine's output in several dimensions simultaneously (e.g., crane driver, aircraft pilot, controlling the movement of a gun in two dimensions, etc.).

Experiments have shown a definite and large gain in accuracy when one lever, of the joystick type, controlled machine output in two dimensions, as compared with the alternative arrangements of two separate one-dimensional levers, one held in each hand, or using two separate human operators. This finding does not mean, of course, that joysticks which combine two or more functions should, or could, be fitted to all the machines which currently use many separate controls, because it is evident that mechanical factors are also involved. But it does mean that combined controls may often tend to improve the operator's efficiency, and they are therefore preferable when the machine can be designed to use "combined" as effectively as "divided" controls. Here it may be observed that machine characteristics can be altered, whereas human characteristics are fixed, and are frequently the main source of errors. It is clear, therefore, that machines should be designed initially to suit the man, rather than attempting, by selection and training procedures to fit the man into the machine.

Experimental Work

This brief survey of the basis of manual activity points to some major requirements for effective controls and their layout. There will generally be an optimal arrangement for any given purpose, but it cannot be determined without considerable attention being given to the operator's characteristics; and the effort involved can only be justified by conclusive evidence of the advantages to be gained. Recent experiments have shown that considerable improvements result from finding the optimal conditions for the proprioceptive system alone, and the results typify those of experiments which have tested many other factors, such as vision and the interaction between the senses. Experiments were set up where a single joystick controlled the movements of a spot of light, in two dimensions. The operator's task was to keep the light steady on a fixed index, against the action of an external "course-setting"

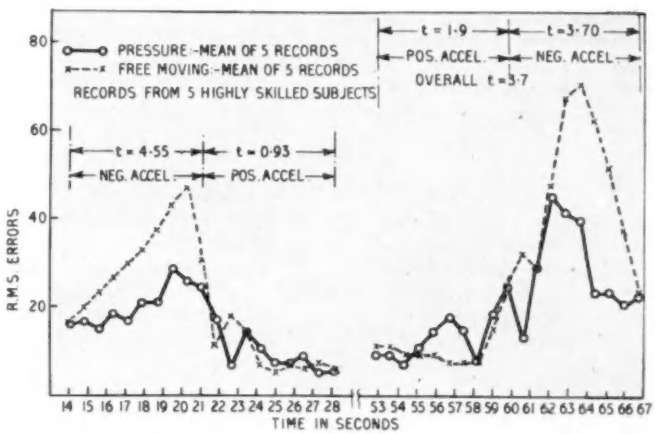


Fig. 1. When the spring-loaded joystick described in the text was used the improved performance shown by the firm line was obtained. Results with a free lever are shown by the dotted line

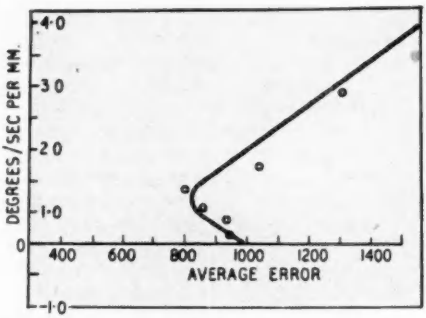


Fig. 2. Gear ratios affect performance as illustrated by this curve

device which tended to keep the spot in continuous motion, away from the index. Tracking accuracy was measured; and the time taken to move the spot through a fixed distance, to a given level of accuracy.

Two different types of joystick were compared. In one set-up a unit movement of the lever altered the speed of the light through a given range (velocity control). In the other case, the lever was fixed by strong spring centring, but it could be deflected very slightly by applying pressure. These small deflections were amplified, and used to alter the speed of the light as before; so that the basic comparison was between the accuracy and speed of changing limb position, and changing the force exerted by the limb.

The pressure control was much superior for continuous tracking (Fig. 1) and about one second faster in completing an accurate, discrete adjustment. It was much easier to learn to use the pressure control, and more people could reach a high level of skill.

Pressure superiority was probably due to many factors. It was found that the spring loading of the pressure control gave a definite advantage when it operated in the same direction as the operator's adjustments, but not when it opposed them. The explanation may be that muscular force can be dissipated more rapidly under the influence of an external force than it can be generated to oppose such force; hence assistance from spring loading may have reduced one component in the operator's reaction time, thus reducing the lag in responding to environmental change. The time taken in making an accurate controlled movement of moderate extent is about 0·2 seconds, and this component of the total lag was probably reduced by using pressure control since the operator's movements were negligible. Finally, the proprioceptive system operates at much higher efficiency when the muscles contract without shortening, as in pressure conditions; and the sensory data are then less complex and ambiguous than is the case during movement. The control has its greatest advantage when rapid responses are made to an unexpected change in the environmental conditions; and in certain control systems where the visual changes do not clearly and instantaneously define the movements of the controlling limb (e.g. with "lagging velocity" controls, because in these systems a visually observed *speed* defines limb position; and estimates of speed are undoubtedly slower, and less accurate, than visual observations of *position*).

The advantages of determining the optimal conditions of another mechanical variable are shown by Fig. 2. This shows the results of varying the control gear ratios, i.e., sensitivities; different "gear ratio" settings are plotted against the operator's errors. There are asymptotes and an optimal point, which again give measures of proprioceptive efficiency. The sharp drop in efficiency away from this point would, of itself, justify the greatest care in defining the best working conditions for the operator, whenever manual controls are designed.

PARIS-LONDON T.V. LINK

TELEVISION viewers are waiting with considerable anticipation for the forthcoming programmes (July 8-14) which will be transmitted from Paris. The technical arrangements made for this series of transmissions are of particular interest in view of the difficulties involved. At Paris, the outside broadcast signals will be transmitted to a receiver on the Eiffel Tower by a 9,000 Mc/s radio link designed and manufactured by the Compagnie des Compteurs, and will then be transmitted on the French 819 and 441 line systems. From Paris to Lille, the 819-line vision signals will be carried by the R.T.F. experimental radio link on 900 Mc/s made by Compagnie Francaise Thomson Houston, and from Lille to Cassel on 180 Mc/s on a link made by Societe Desmet. At Cassel the system will be converted from 819 to 405 lines and transmitted to Alembon on 7,000 Mc/s (Marconi's Wireless Telegraph Co.). Alembon to Swingate (Dover) is covered by a 4,500 Mc/s link (E.M.I.), Swingate-Wrotham at the same frequency, and Wrotham to London also at 4,500 Mc/s (S.T. and C. Co.). It can thus be seen that the overall system provides a fine example of international technical co-operation.

Power Farming at Royal Show

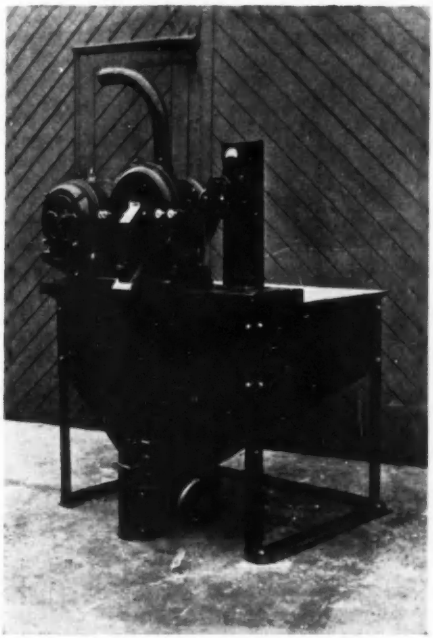
Electricity offers Efficiency to the Small Farmer

PARTICULARLY appropriate in view of its association with the planned rural electrification development put under way by the South Western Electricity Board, Devon provided a perfect setting for the 1952 Royal Show. Dominating the scene at Newton Abbot, the 40 ft model pylon of "Electricity Farm," staged jointly by the Board and E.D.A., set the keynote to the exhibition—the multiplicity and versatility of electricity and its value, in particular, to the small farmer. Filling the gap left by the banning of cattle exhibits, due to the prevalence of foot-and-mouth disease, many associations provided supplementary exhibits, among which were to be found that of E.D.A. and S.W.E.B. At this stand were staged continuous demonstrations of the many applications of electricity to farming, including films, and diaramas displayed by E.A.W. depicting domestic electrification.

Recognising the frequency with which the small farmer occurs in the English rural scene, most exhibits were aimed in this direction. Labour-saving devices and machinery, automatic in action, requiring little or no attention whilst in operation, provided a basic theme.

Self-contained Power Units

Despite the development of rural electrification, public supply in many rural areas is not yet provided, hence well to the fore in trade exhibits were petrol or diesel generating sets. R. A. Lister and Co. Ltd. were displaying a range of their well-known generating sets now at reduced prices, including the fully automatic 55 V generator rated at 1 kW, and the 110 V model supplying a load of 2.5 kW, both d.c. In alternators were featured the 2·5 kW "Start-o-matic" and a heavier machine rated at 8 kW and complete with 12 V automatic control equipment, both outputs being at 230 V single phase. On show in Anning and Mansfield's stand were 3 and 5 kVA 230 V generators for power appliances and supplying also d.c. at 50 V from batteries. A popular set is that which is operated when any lighting or power point is switched on. Two firms were exhibiting these, A. C. Morrison's and Arthur Lyon Alcomatic lighting sets.



Essex Major Mill showing low-level hopper

Portable generating sets convenient for electrically operated hand tools were shown also by Anning and Mansfield's, in which the set

Horticulturalists will find interest in this G.E.C. plant illuminator using Osram M.A. lamps

complete with tools for a wide range of work is housed in a mobile tool unit. For those wishing to energise their farming implements Petters were exhibiting a range of petrol and diesel motors ranging from the small all-purpose engine A1 to their latest power source, the PAV4, developing 19 b.h.p. at 2,000 r.p.m.

Examples of electric starting equipment were to be found in the recently developed Villiers starter designed for use with this company's stationary engines and C.A.V. starters for heavy tractor diesel engines. A complete range of oils and grease for diesel or petrol engines was provided by various oil companies among which were Esso Petroleum Co., C. C. Wakefield, of "Castrol" fame, and Shell-Mex and B.P. Ltd. Completing the generating section was the Joseph Lucas "Freelite" electric lighting plant in which the windmill is used as a source of electric power.

Power-Operated Exhibits

Without doubt the greatest use of electricity in farming is in providing motive power. In barn machinery this source of power is to be found in the combined grain pick-up and transporter exhibited by Air Control Installations, who were also exhibiting an electrically powered crop loader. George Reffold's electrically driven belt conveyor for small load racks was a further example of this application. An all-electric hoist, a G.E.C. exhibit, capable of loads up to 2¼ cwt., will be a useful addition to barn machinery. Working on the double rope principle, the hoist incorporates an automatic switch to prevent overrunning and a magnetic brake which is in operation on no-current.

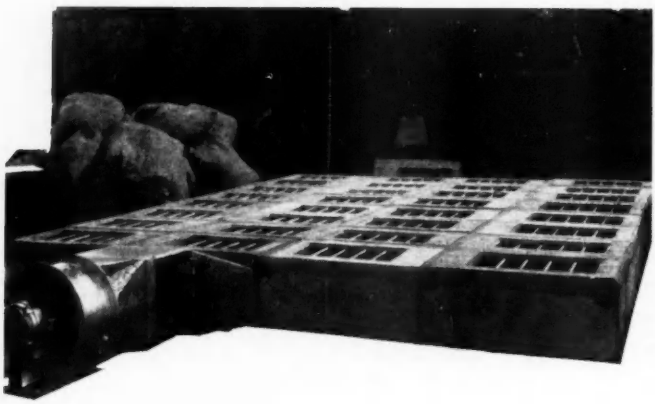
Grinding and milling machinery driven by electric motors was well represented. Christy and Norris were showing two items in this connection, their well-known Essex Major Mill, automatic in operation, fitted with the new-type low-level hopper. For analytical laboratory use their 8 in. laboratory mill, on show, should prove of value, enabling feeding stuff to be finely ground for protein and carbohydrate analysis. Also demonstrated in this sphere were Bentall's "Marvel" oat crusher and "Wizard" automatic mill.

Dairy Farming

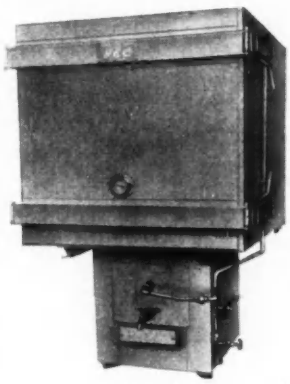
Electro-motive power has added value in dairy farming, where cleanliness is of paramount importance, and the exhibits in this section point to manufacturers' realisation of this asset. Permanent and portable milking machinery demonstrated by Fullwood and Bland included equipment designed for the farmer milking a small herd, and featured their midget and portable plants, incorporating movable electric driven vacuum pumps.

Other milking machines employing electro-motive power were those of Melotte and Alfa-Laval. In the Melotte stand was also to be found their model SN cream separator electrically driven by a self-contained motor with elastic drive. Provision in this machine is made to drive a separate churn by belt from the same power unit so that both operations can be carried out simultaneously. The Churn Co. were exhibiting a combined cream separator and butter-making churn and a range of "Electrochurns," all of which were powered by electric motors. Of convenience to the housewife was their "Denamix," a small electrically powered whisk operating at very low cost and suitable for small-scale butter churning, food mixing, and similar domestic uses.

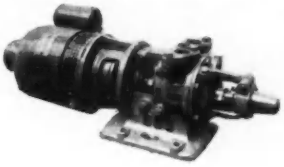
In the poultry exhibits, the most frequent use of electro-motive power was to be found in the cafeteria laying battery, of which there were several exhibits. That of Whitlock Bros. has now an improved system of electric scrapers and feeders to reduce additional labour to a minimum. This firm was also exhibiting an electrical mash mixer of 10-cwt. capacity. Swifts of Scarborough exhibits included three- and four-tier batteries and the "Venner" poultry switch, designed to switch off and on automatically in three stages, creating in the process a period of artificial twilight. The "Snowhite" egg-cleaning machine, in which eggs are



Woolley's in-Sack Grain Dryer



G.E.C. Hot-block Steam Raiser

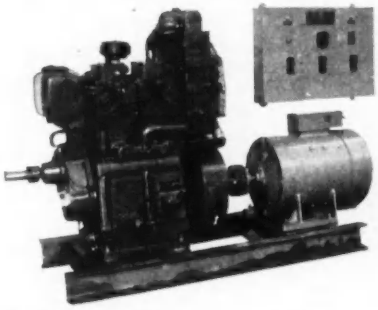


Gilbert Gilkes and Gordon's compact domestic water pump

Cooper-Stewart battery operated Animal Coaxer

Wolseley's 'Tent' type insulator for electric fencing

A Lyon's Alcomatic 5 kVA generating set



SOME ROYAL SHOW EXHIBITS

cleaned in a perforated cylinder revolving in a trough of water, was another of their implements.

Motors for general purposes were seen on the Brook Motor's Stand. Newly introduced was the type TC totally enclosed fan-cooled motor, in which cut-away sections enabled this system to be inspected. Fractional horse-power motors formed part of their display and could also be seen in the Hoover Mobile Showroom. A variety of electric motor-driven pumps with many uses in farming were displayed by Gilbert Gilkes and Gordon, Ltd., and the Wolseley Co. Domestic application of this source of power was demonstrated in the Hoover washing machine, a useful helpmate for the farmer's wife.

Fencing equipment displayed by Cooper-Stewart gave details of their "Fencemaster" operating on the "make and break" principle. Other examples included those of Bayliss Jones and Bayliss, and Wolseley, exhibiting a new version of their "Tent" type insulator.

In-sack grain drying equipment was gaining prominence among exhibits of this nature, and demonstrated the safety of electricity when used to generate heat. G.E.C. duct air heaters used with Woods Acrofoil fans were among examples, and illustrated is the Woolley Electric in-sack grain dryer.

Constant hot water for sterilising purposes, of special importance to the dairy farmer, could be supplied from many of the heating units on show. Barford's (Agricultural) stand included their Electroblock sterilising unit, comprising a heat storage block and hot-water tank, with a total consumption of 2½ kW. Illustrated is the G.E.C. hotblock steam raiser.

Infra-red heating is taking an important place in modern farming and various firms were displaying infra-red heaters for livestock rearing. Featured in Electricity Farm were G.E.C. infra-red heaters and "Laybat" infra-red units, both used for farrowing. This firm were also exhibiting a long range unit designed for calving and foaling and brooding units employing infra-red, as were Philips.

Refrigeration plant, exhibited by the Pressed Steel Co., included two large coldrooms for dairy and butchery, with a smaller unit for deep-freezing farm products. For domestic use, G.E.C. were, in addition, displaying examples of household refrigerators.

Electronic equipment is establishing for itself a place in farming and notable examples of its use were in the protein extraction plant by Fyna Industries, in which automatic control of all operations is effected by electronic equipment, and in pH and moisture meters demonstrated by Marconi Instruments, designed for field or laboratory use. Domestic electronic equipment, in the well-known form of the television receiver, was shown by Curry's Ltd.—advance models for use in the B.B.C. Western Television transmitter area.

The End of London's Trams

Last Services discontinue This Week

THE last chapter in the history of London's trams will close next Saturday night, when the final stage in the tram-bus conversion is completed. Thus ends nearly a century of tram transport in Great Britain's capital, for it was in March, 1861, that the first horse-drawn single-deck tramcar made its appearance in the London streets. This first venture was, however, doomed to failure as the rails projected above the road surface to the inconvenience of other road users, and the system had to be removed.

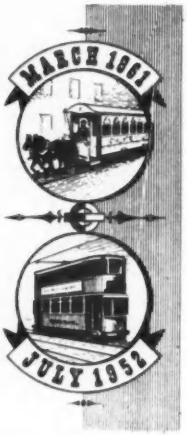
In 1868, however, sanction was given for the "Metropolitan Street Tramway" from Westminster Bridge to Kennington, and this was followed by numerous other systems. By 1876 the suburbs became affected and the "Southall, Ealing and Shepherds Bush Tram-Railway Co." came into operation. Progress from then on was rapid.

The cost, however, of horse operation proved extremely heavy, and not unnaturally the tramway promoters sought other means of locomotion. In 1871 Loftus Perkins patented a steam "tram-horse," to be followed a little later by John Grantham's steam-operated tramcar.

Electricity Appears

Electricity made a fleeting appearance in 1883, when the first self-contained electric tramcar—a battery-operated horsecar—worked for one day only on the West Metropolitan system. Other mechanical experiments included cable operation and compressed air propulsion. In the late 1880's the battery car made a second and more successful appearance on the Barking Road. Some of these cars ran for as long as three years.

With the turn of the century, London followed the lead given by many provincial towns and introduced the independently powered tram. The honour of the first installation fell to London United Tramways, whose electrical system was designed and constructed by Clifton Robinson. In the meantime the London County Council had been buying up tramway systems under the 1870 Act, and by 1909 they possessed 113 miles of tramway north and south of the Thames. By 1915 the last horse tram had vanished and the Council then had no fewer than 144 route miles of electric tramway in operation. Two independent companies, London United and Metropolitan Electric, continued to operate in Middlesex and elsewhere certain local authorities continued to operate their own system.



Commemorative design on back of tickets issued on trams this week

The north and south sections of the L.C.C. system had been linked by the completion of the Kingsway Tram Subway in 1908, thus permitting the running of through services from Highbury to Tower Bridge or Kennington via Westminster Bridge. In 1909 the Embankment tracks were extended and crossed the river by Blackfriars Bridge, thus making possible the loop working over the two bridges which has remained in use until the present day.

By the 1920's the omnibus was making serious inroads into the tramcar passenger traffic, and in 1920 the L.C.C. incurred their first deficit. An attempt in 1931 was made to regain lost ground. The London United and Metropolitan Electric companies introduced a radically improved tramcar, but the former company also introduced in the same year the first London trolleybuses. No new trams were built for London after 1932, and in 1933 the London Passenger Transport Board was formed and took control.

This organisation embarked on a policy of substituting trolleybuses for tramcars, and by 1940 a large amount of conversion, north of the Thames, had been carried out. War, however, halted this programme, and with the return of peace, arguments were found favouring the oil-engined bus over the trolleybus. The remaining tramways were therefore converted to bus operation in stages, the final one of which will be completed this week-end.

Report on THE CABLE INDUSTRY

Monopolies Commission Calls for Abandonment of Many Agreements

SUGGESTIONS that some of the agreements entered into by the Cable Manufacturers Association and the Covered Conductors Association operate "contrary to the public interest" are made in the report* of the Monopolies Commission on the supply of insulated electric wires and cables.

Members of the C.M.A. and the C.C.A. are stated to come within the conditions laid down by the Act because in 1943 they supplied about 76·5% by value of all cables for the United Kingdom. It is further considered to be clear that members of the C.M.A. and the C.C.A. and their associated and subsidiary companies so conduct their affairs as to restrict competition in connection with the supply of cables.

It is admitted in the report that the C.M.A. has played a predominant part in establishing the high reputation and the export trade of the British cable-making industry. Although the C.M.A. and C.C.A. systems have always had common prices as a leading feature, it is claimed "with truth" that they are something much more than price rings. Both associations have established minimum standards and insist on high quality. The high standard of control of quality has been of great benefit.

Both the C.M.A. and the C.C.A. have argued before the Commission that the common minimum standards and the exchange of information and technique are dependent upon agreement in price. While seeing some force in this claim, the Commission feel that price competition would not necessarily lead to the abandonment of such valuable work. B.S.I. standards are a safeguard of quality, and much useful research is carried on by research associations.

Since common prices rather than minimum prices are fixed by the associations, the whole system of competitive tenders is vitiated. Against this disadvantage must be placed the question of quality, already discussed, the level at which the common price is maintained, and the bargaining strength of the buyer. Each type of cable is, in the report, examined under these headings.

Mains Cable

For super-tension cables the advantages of technical collaboration are great, while the buyer (the B.E.A.) has a near-monopoly. With mains cable at 33 kV and below, the B.E.A. is still the largest buyer, but the products are largely standard types. The method of pricing is to take the average of the five lowest estimated total costs submitted, and add a percentage for profit (usually 10%). However, the B.E.A. is considered to have sufficient strength to ensure that prices are fair. Prices to small buyers of mains cables should bear a direct relationship to prices to the B.E.A.

Rubber Cable

The Commission is satisfied that the method adopted by the Rubber and Thermoplastic Cable Manufacturers' Association (affiliated to the C.M.A.) cannot be justified. The prices charged are arranged by taking the average costs of the five lowest-cost producers, adding profit rates, and then adding 12½% to cover "pay-aways." The average profit rate aimed at is 25% on total costs. There is so much variation in costs between one member and another that the Commission feels that there must be scope for price reductions, and conclude that the C.M.A. system of common prices for rubber cable should be brought to an end.

In recognition of the importance of maintaining a high level of quality in the industry, and of keeping a measure of stability, the Commission feel that the R.C.M.A. should be permitted to fix minimum prices as a means against extreme price cutting. These prices, however, should be no higher than will ensure a reasonable profit to the lowest-cost producer of each type of cable. In the event of such minimum prices being established, appropriate Government departments should from time to time review costs and profits.

Covered Conductors

Price fixing by the C.C.A. averages the three lowest costs of production and adds a standard

profit margin of 15%. This system of common prices is considered as likely to operate against the public interest, and it is concluded that it should be brought to an end. In the interest of quality, however, the fixing of minimum prices should be allowed on the conditions suggested for rubber cables.

Submarine cables are not affected by the Commission's recommendations, though it is considered important that no international agreements should be entered into. For telephone cables certain price agreements, it is thought, should be brought to an end. Bulk orders by the G.P.O. to members of the Telephone C.M.A. are reviewed, and on the whole approved, though it is considered that where bulk orders are placed their existence should be publicly announced.

Sharing Business

Both the C.M.A. and the C.C.A. have arrangements for sharing the business available by means of quotas and attendant penalty and bonus payments (the Commission's terms). Although there is some doubt about the precise effect of these schemes, the Commission considers it important in the public interest that the lowest-cost producers should be able to expand their output in relation to others with as little hindrance as possible. They therefore recommend that these arrangements for sharing business should be brought to an end. The associated practice of allocating orders for cables amongst members of the C.M.A., with the allottee quoting an agreed lower price, is also recommended for discontinuance.

The Commission are satisfied that there is no evidence of a restrictive policy being followed by the C.M.A. or the C.C.A., though there is an agreement between British Insulated and British Ropes which includes a covenant prohibiting the latter from manufacturing cable. It is recommended that this should not be renewed when it expires in 1958.

Specifications and Patents

Evidence is presented in the report of C.M.A. resistance to the publication of quality requirements in B.S.I. cable specifications. This left only the C.M.A. secret standard as a recognised standard of quality, and put competitors at a disadvantage. The Commission recommends that clauses governing the quality of insulating material should be included in appropriate B.S.I. cable specifications as soon as the necessary technical details can be agreed. Confidence is expressed that C.M.A. and C.C.A. policy will proceed on these lines.

C.M.A. policy on patents is characterised as having always been liberal, with licences being made available to members and non-members alike. Since C.C.A. policy has likewise been liberal, no recommendations are made.

Although no suggestion has been made that there has been abuse in the supply of copper, apprehensions have been expressed to the Commission. It is, therefore, suggested that when the present system of allocations is ended, the Government should continue to keep a watch on the situation.

Rebates and Discounts

Finally in the Commission's conclusions come their views on rebates, discounts and other selling arrangements. With regard to rubber and plastic cable, exclusive dealing discounts exist. R.C.M.A. members may give wholesale terms (trade terms less a 16% discount on delivery to a wholesaler or 12½% on delivery directly to a wholesaler's customer) only to wholesalers who undertake to deal exclusively in R.C.M.A. cable. Trade terms (list prices less 25%) are given to other wholesalers, Government departments, etc. All buyers eligible for trade terms receive a 5% annual rebate if they agree to deal exclusively in R.C.M.A. cable.

Two other agreements do not depend on exclusive trading. An aggregated quantity rebate on a varying scale is available to any trade-terms buyer, and an association rebate of 1% exists in the case of the E.W.F., and 2½% in the case of N.E.C.T.A. and the E.C.A. of Scotland.

These exclusive trading rebates and the association rebates are considered as contrary to the public interest, as making competition more difficult, and their ending is recommended. The denial of trade terms to retailers and industrial consumers lacking qualified electrical staff is reluctantly noted to be not contrary to the public interest.

Mains cable rebates to N.E.C.T.A. (5%) are considered as making competition more difficult, and as providing an incentive to contractors to join a particular organisation. Certain C.C.A. agreements are also recommended for ending.

In its earlier section the report examines in some detail the history of the cable industry and the various agreements entered into by the Association. A series of appendices sets out statistical information, membership lists, and the text of agreements.

* "*Monopolies Commission Report on Insulated Electric Wire and Cables.*" *Published by H.M. Stationery Office, price 5s.*

CONTRACTORS' CONFERENCE

Trading Problems and Registration discussed in President's Address at Eastbourne

LAST year the conference of the Electrical Contractors' Association was much concerned with the Association's successful completion of fifty years of activity. For this year's gathering at Eastbourne, there was a return to the consideration of more normal business, a theme for which the president, Mr. Stanley Watkins, set the scene in his address.

Routine business was indeed the first activity of the conference, for the Council of the three Associations met on Monday morning to consider private business, while the public function did not occur until the evening. This was a reception by the president in the Floral Hall of the Winter Garden, scene of the conference sessions.

Mr. Stanley Watkins, the retiring President

President's Address

Tuesday began with a Civic Welcome, which was accorded the conference by the Mayor of Eastbourne. After making a suitable reply, the president delivered his address.

Looking forward to the next 50 years of association activity, Mr. Watkins saw the future of electricity as revolutionary, rather than evolutionary. Electricity supply, he predicted, would develop to an extent which could not be visualised. But in spite of this, there were enough problems to occupy the E.C.A. in the immediate future and the present. He did not intend to deal at any length with the technical aspects of the association's work, but the technical committee seemed to be providing considerable work for the I.E.E.'s wiring regulations committee.

Turning to the commercial and trading aspects of contracting and retailing, he characterised relations with the manufacturers as happier than at any time in the past. Trading conditions were not satisfactory, but there seemed to be growing recognition of the problems of the contractor and retailer. Reports of the Monopolies Commission were of importance in this respect, and the president remarked that whether or not the recommendations of the commission were implemented seemed to be a matter of party politics, with only an element of commercial judgment and justice.

It was not sufficiently realised by the Government and others that the specialist in the industrial and commercial field was as important to the country as that other specialist, the scientist. The only questions which should be investigated were: was the price charged fair and reasonable, and was effective and efficient service available? If the answer to these queries was yes, then there was no case for bureaucratic interference.

On the attitude to the profit motive generally, Mr. Watkins said that he was in favour of short working weeks and high wage packets provided there was commensurate production. He repeated the plea of his predecessor, that there should be co-operation between all elements in the industry, and that all who render a service should receive a fair reward for their efforts.

Contracting Principles

Negotiations with the B.E.A. on certain matters arising out of the Summary of Agreed Principles on Electrical Contracting had not had the degree of success which the Association would have wished. Discussions with the B.E.A. and the area boards had had the single object of securing a basis for parity of competition. They did not believe that the B.E.A. should or did desire to utilise its unique position to secure advantages over the private trader. Unfortunately, certain public authorities confined their work to the appropriate area board, without giving the private trader an opportunity to tender. There was a similar problem where direct labour was employed.

With the object of giving specialised examination to problems associated with retailing which did not apply to the contracting field, the council of the E.C.A. had set up a National Committee on Electrical Retailing. This consisted of 20 members elected by sections throughout the country. Legitimate electrical traders outside the contracting ranks could be admitted to N.E.C.T.A. and represented by the committee.

A particular problem affecting the retailer was the effect of purchase tax, including its

inflation of the total capital required to be tied up in a business.

There was a growing need for after-sales service of current consuming appliances. Often no such provision was made by departmental stores, although they reaped the full margin of profit on the appliance in question. The time was overdue when the manufacturer would have a standard service system operating within reach of all customers. A standard charge for the installation of appliances should also be agreed, and advertised by the manufacturer, unless his trade discount were made sufficient to cover the cost of installation. Increased specialisation in after-sales service with reciprocal trading agreements between contractors to make it worth while, seemed desirable.

On the whole the year had been one of industrial peace. A small committee had been engaged with the E.T.U. in examining the labour structure of the industry. A new problem that had appeared during the year was that of materials scarcity. Possibly contractors were a little too conservative in their advocacy for the use of steel conduit in all circumstances.

Inspection Council

As a final subject for comment in his address, the president selected the draft report of the organising committee set up to consider the formation of a National Inspection Council. The E.C.A. had participated in all the discussions of this body, but had still to make a decision on the proposals that had been put forward. The Association had always favoured compulsory registration of the contractor and operative. An experiment had been tried in the experimental field without anything like the success that had at first been thought possible. The industry should not embark on any scheme for voluntary registration unless it was satisfied that it could confer on the public the desired degree of safety.

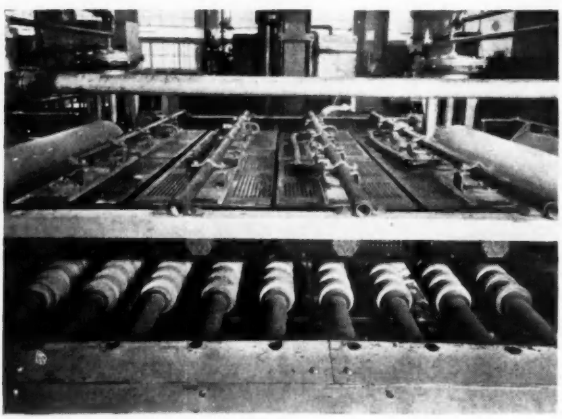
After the president had concluded his address with a reference to those who had supported him during his year of office, and especially the director of the Association, Mr. L. C. Penwill, C.B.E., the conference papers were presented and discussed. With this and the subsequent proceedings of the conference we hope to deal in next week's issue.

Glass Lamination Uses Infra-Red

AMONG problems involved in manufacturing laminated safety glass, that of the adhesion of glass sheets to a suitable interlayer presents considerable difficulty. Using infra-red heat to provide initial adhesion, Triplex Safety Glass Co. has been able to simplify this problem, with a consequent increase in production. In the preliminary stages, two glass sheets, separated by a Vinal interlayer, are assembled on a conveyor belt. After careful alignment they are passed through rubber-covered pressure rollers, whilst heat from electric infra-red units is applied to the materials, causing initial adhesion. Placing the glass in autoclaves, where it is subjected to predetermined heat and pressure, finalises the adhesion.

The infra-red units house new Metrovick electric infra-red projectors, incorporating tubular sheathed elements of spirally wound wire, operating at red heat. To these elements are fitted aluminium reflectors which, fixed to a robust frame constructed to an optimum of maximum strength and minimum weight, make up the projector.

Units of two or three of these projectors, clean and efficient in use, can be adapted to most production lines, enabling energy to be concentrated where required.

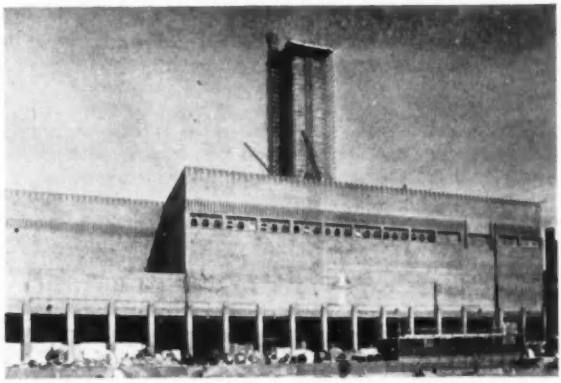


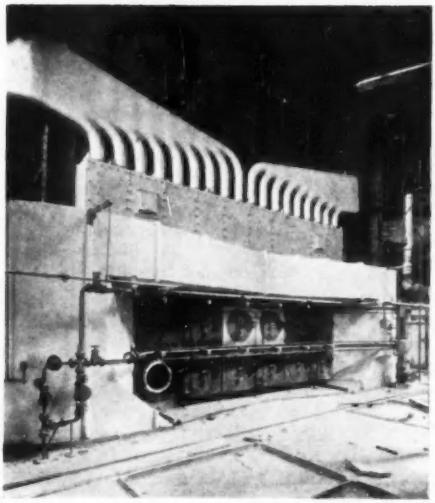
Infra-red installation at the Triplex Works for glass-vinal bonding. The units, enclosed in perforated covers, are fixed above and below the pressure rollers

BANKSIDE takes shape

London's specially designed Power Station nears commissioning date

THE first half of Bankside power station, in the heart of London, is now rapidly approaching completion as can be seen from the accompanying pictures. This station, designed by Sir Giles Gilbert Scott, will be built in two sections, each housing two 60 MW turbo-alternator sets supplied by B.T.H. The completed station will, therefore, have a total capacity of 240 MW and will contain eight oil-fired Foster Wheeler boilers. Steam conditions of the boilers are

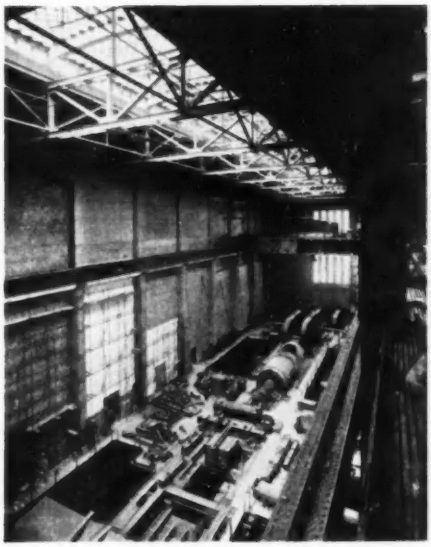




Above can be seen the present state of the building structure. Some idea of the impressiveness of the final structure may now be gained. The oil-firing system (on the left) gives an unusual appearance to the boilers. Below, in the turbine room, is one of the 60 MW sets in course of erection

950 lb/sq in. at 925° F. These come down to 900 lb/sq in. 900° F at the turbine stop valve.

The alternators are conventional air-cooled units using separate fans, and will generate at 15 kV at the tail ends. Each generator will be connected to a 66 MVA transformer. Main switchgear is to be housed in a switch house annex. Special precautions have been taken to eliminate as far as possible all harmful products of combustion, and the flue gases will be scrubbed in two towers by river water to which finely divided chalk will be added.



The Principle of the INDUCTION METER

An Apparent Anomaly between the Mathematical and Physical Treatments of the Theory resolved

By G. F. TAGG, B.Sc., Ph.D., M.I.E.E., F.Inst.P., Fel.A.I.E.E.

THERE still exists a certain amount of confusion in all explanations of the production of the driving torque in an induction pattern watt-hour meter. The confusion mainly arises from an apparent discrepancy between mathematical and physical analyses of the action. The meter consists essentially of three elements:—(1) a voltage electromagnet; (2) a current electromagnet; (3) a conducting disc.

Each electromagnet produces a flux which, passing through the disc, induces currents therein, and the total current flowing in the disc at any point is a combination of the currents produced by the two fluxes. For the purpose of analysis, however, the components of the total current produced by the two fluxes may be treated separately in determining the torque, and the total effect obtained by combining the component effects. Thus we may say that the flux from the voltage electromagnet induces

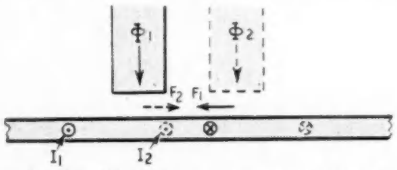


Fig. 1.—Schematic arrangement of meter

currents in the disc, which react with the flux from the current electromagnet to produce a torque. Similarly the flux from the current electromagnet induces currents in the disc, which react with the flux from the voltage electromagnet to produce a second torque. The total torque is a combination of the two, and it is here that the confusion arises. A physical analysis of the torques produced in a watt-hour meter, *in the practical form in which it is used*, shows that the mean values of the component torques are in the same direction and therefore add together. A mathematical analysis, however, requires that the difference of the component torques be taken, and this is the apparent contradiction which requires explanation. It must be borne in mind that a mathematical analysis starts from a certain specified set of conditions and, generally speaking, itself takes account of any variation from these conditions. So the above contradiction will disappear if one of the *calculated* torques can be shown to be negative, as then the mathematical subtraction becomes a physical addition. We shall see that this is indeed the case.

Fundamental System

Let us consider the simple arrangement of Fig. 1. Here we have an electromagnet producing a flux Φ_1, which is inducing a current I_1 in the disc. These flux and current waves are shown in Fig. 2, and it is assumed for simplicity that the disc has no inductance, but only resistance, so that the current I_1 lags 90° behind Φ_1. Now suppose there is a second electromagnet Φ_2 as shown *in phase with* Φ_1 producing a current I_2 which lags 90° behind Φ_2 and is thus in phase with I_1. The interaction of I_1 with Φ_2 will produce a force F_1 and the interaction of I_2 with Φ_1 will produce a force F_2. In this case, these forces can be represented by the same wave in Fig. 2. The mean force over a cycle is zero in this instance. Fig. 1 shows the direction of the currents and forces, during the period a—b of Fig. 2, the fluxes being taken as positive when acting downwards, and from this it is evident that the two forces are in opposition during this period a—b. It can be easily verified

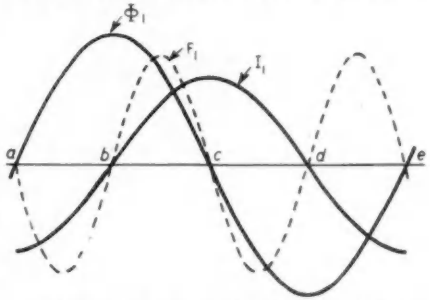


Fig. 2.—Basic current and flux phase relations

that this is true also for the remainder of the cycle. Now this condition of Φ_1 and Φ_2 in phase is the starting point of all calculations

the analysis itself taking care of any shift in phase we may care to postulate, and it is therefore necessary to take the *difference* of the instantaneous calculated values of torque.

This does not mean that physically the instantaneous values of the forces or torques are in opposition under all conditions, but that the difference of the calculated values must be taken.

Practical Case

Let us now consider the case when the flux Φ_2 lags 90° behind the flux Φ_1. The various flux, current and force waves are shown in Fig. 3. The current I_1 lags 90° behind the flux Φ_1, and the interaction of this current with the flux Φ_2 gives rise to the force F_1. Again the current I_2 lags 90° behind Φ_2 and the interaction of this current with the flux Φ_1 gives rise to the force F_2. As these forces are shown in Fig. 3, it

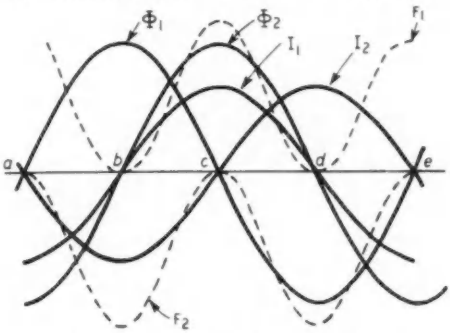


Fig. 3.—Current and flux relationships in practice

would appear that they are in opposition, but it must be remembered that the mathematical analysis is based on Fig. 1, and the net force and therefore torque is the difference of the instantaneous values and is therefore $F_2 - F_1$. This leads to actual summation of the physical values. That this is the true picture is illustrated in Fig. 4. Here the cycle of Fig. 3 is divided into four parts, and the directions of the fluxes, currents and forces are indicated. It will be seen that throughout the cycle, the two forces F_1 and F_2 are always in the same direction and physically add. We shall see when we calculate the force F_1 that the calculated value is negative and hence a mathematical subtraction leads to a physical addition.

Now let us suppose that Φ_1 is the flux produced by the current electromagnet of the watt hour meter, and Φ_2 is the flux produced by the voltage electromagnet. Let v and i be the instantaneous values of the voltage and current and φ be the angle of the lag of the current on the voltage. Then we may unite

$$v = V \sin \omega t; \quad i = I \sin (\omega t - \varphi)$$

where V and I are the maximum values. Now we may write the current flux Φ_1 as proportional to the current i and in phase with it, if we ignore any losses in the iron. So

$$\Phi_1 = k_1 i \sin (\omega t - \varphi)$$

The voltage flux Φ_2 will lag behind the voltage v by an angle β and may be taken as proportional to v, and so

$$\Phi_2 = k_2 v \sin (\omega t - \beta)$$

The induced current I_1 is

$$I_1 = \frac{1}{R} \cdot \frac{d\Phi_1}{dt} = \frac{\omega k_1}{R} I \cos (\omega t - \varphi)$$

and the induced current I_2 is

$$I_2 = \frac{1}{R} \cdot \frac{d\Phi_2}{dt} = \frac{\omega k_2}{R} V \cos (\omega t - \beta)$$

where R is the resistance of the disc.

The force F_1 is due to the interaction of the flux Φ_2 with the current I_1 and so

$$F_1 = K \; k_2 V \sin (\omega t - \beta) \; \frac{\omega k_1}{R} I \cos (\omega t - \varphi)$$
$$\propto VI \sin (\omega t - \beta) \cos (\omega t - \varphi)$$

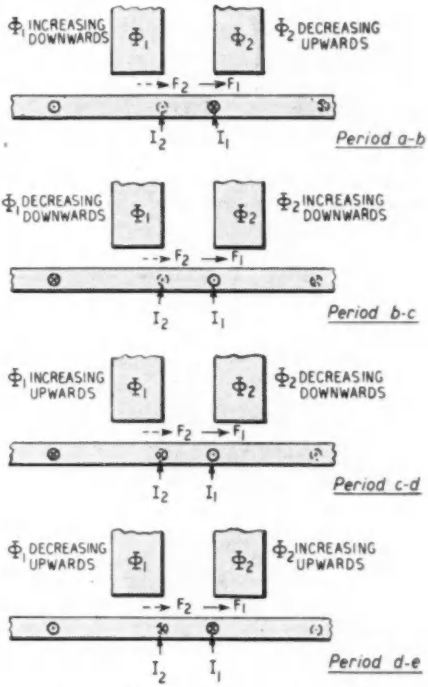


Fig. 4.—Conditions during one cycle of operation

The force F_2 is due to the interaction of the flux Φ_1 with the current I_2 and so

$$F_2 = K\ k_1\ I \sin(\omega t - \varphi)\ \frac{\omega k_2}{R}\ V \cos(\omega t - \beta)$$
$$\propto VI \sin(\omega t - \varphi)\ \cos(\omega t - \beta).$$

In the watt hour meter β is made 90°, and if we insert this value we have:—

$$F_1 \propto VI \sin(\omega t - 90) \cos(\omega t - \varphi)$$
$$\propto -VI \cos \omega t \cos(\omega t - \varphi)$$
$$F_2 \propto VI \sin(\omega t - \varphi) \cos(\omega t - 90)$$
$$\propto VI \sin(\omega t - \varphi) \sin \omega t$$

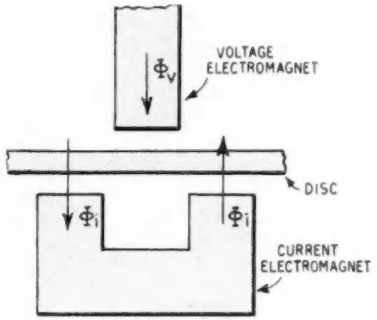


Fig. 5.—Usual layout for poles and disc

Note that the force F_1 has a negative sign as we expected. This force has been calculated on the convention of Fig. 1 and therefore is acting in the opposite direction to that shown in this diagram, i.e. in the same direction as F_2 and in accordance with Fig. 4. The total force is the mathematical difference of F_1 and F_2, and can therefore be written as

$$F_2 - F_1 \propto VI \sin(\omega t - \varphi) \sin \omega t - \left\{ -VI \cos \omega t \cos(\omega t - \varphi) \right\}$$
$$\propto VI \left\{ \sin(\omega t - \varphi) \sin \omega t + \cos \omega t \cos(\omega t - \varphi) \right\}$$
$$\propto \frac{VI}{2} \cos \varphi$$

The total torque is therefore proportional to the power in the circuit.

In many practical cases, the arrangement of the electromagnets differs slightly from that of Fig. 1, and is as shown in Fig. 5, the current electromagnet having 2 poles (B & C) passing flux through the disc. If now we consider poles A and B, we can say that the voltage flux due to A lags 90° behind the current flux due to B, and thus these two poles constitute a system such as that discussed in Fig. 4 and produce a force on the disc acting to the right. We now have to consider the poles A and C. The direction of the flux from C is opposite to that of the flux from B, and a change in direction is equivalent to a shift in phase of 180°. Consequently we may consider that the flux from C lags 180° behind that from B and therefore lags 90° behind that from A. The result of this is that the two poles A and C again form a pair similar to those in Fig. 4 and also produce a force acting to the right. Since both forces are proportional to the power, the total force and hence the torque on the meter disc is also proportional to the power in the circuit.

The above is a somewhat simplified analysis, the purpose of which is to bring out and explain the *apparent* discrepancy between the mathematical and physical reasoning. It is shown that there is no real discrepancy.

BRITISH STANDARDS

Cables for Vehicles. *B.S.* 1862:1952. *Price* 2*s.* 6*d.* Part 1 of this standard deals with ignition cables and Part 2 with low-voltage cables for vehicles. Experience has shown that the quality of ignition cables is an important factor in obtaining trouble-free ignition in automobile engines. The requirements of Part 1 have been based upon the conditions which have been found necessary in service to provide a good ignition cable having long life. The only type of ignition cable covered by the present edition is that having rubber-insulation and the question of p.v.c. insulated ignition cables is still under consideration.

Part 2 deals with starter, lighting and general purpose, and steering column cables, with either rubber insulation or p.v.c. insulation for automobile wiring systems at voltages not exceeding 100 volts. Both parts contain details of dimensions, types of finish and test particulars.

Capacitors for connection to power frequency Systems, *B.S.* 1650*: Parts* 2 *and* 3*:* 1952. *Price* 3*s.* This standard covers in its two parts intermittently rated capacitors, such as are used for electric motor starting, and continuously rated capacitors below 1 kVAr which are employed, for example, in series with a load circuit as power factor correctors. Permissible tolerances of rated capacitance and voltage (whether intermittent or continuous) are set out in some detail in the sections on general requirements. The inclusion of comprehensive discharge decree specifications aims at protecting personnel who may be working with associated equipment. Test requirements prescribe proof voltages and maximum permissible values of loss angle and insulation resistance intended to ensure safer operation of these components under more severe conditions than are usually met in practice. Marking details of rating plate and terminals are standardised to reduce risk of confusion. Appendices of capacitor kVAr calculations for various circuit connections and outlines of test procedures complete the standard.

Copies of these standards may be obtained from the British Standards Institution, Sales Branch, 24 Victoria Street, London S.W.1.

Problems and Practice
IN ENGINEERING

Safety Holders for Arc Welding

THERE has been produced recently a safety electrode holder for use on a.c. welding, embodying a switch in the handle which is depressed by a spring-loaded lever to connect the supply to the electrode. On releasing the lever at the end of a weld, or to release the stub and insert a new electrode, the lever spring causes the switch to break contact, making the holder "dead."

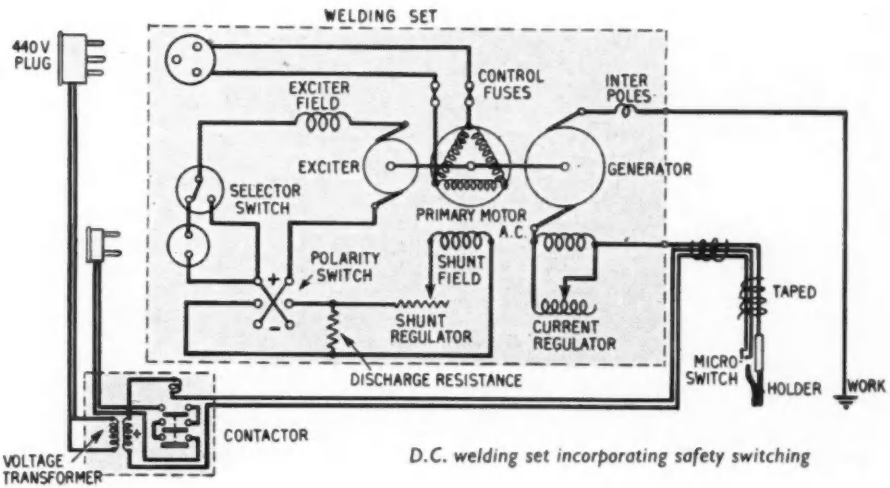
This is a progressive step in safety for a.c. welding, especially when the operator is working under conditions which make a shock or accidental flash particularly dangerous, as in an enclosed space with high temperature, or on scaffolds or ladders. Electric shock from d.c. welding could be equally dangerous under similar circumstances, but the use of a switch electrode holder is prohibited by the insufficient arc break obtainable in the handle of the electrode holder. To provide safety for the d.c. welder, I have fitted to an electrode holder a micro switch, which is connected, by means of a twin 14/0076 t.r.s. cable taped to the welding cable, to the 50 V operating coil of a small contactor. The contactor, which was originally triple pole, is wired with its switches in series and controls the series exciter supply to the welding generator shunt field. Until the micro-switch is depressed there is no generator field and no voltage. When changing electrodes it is necessary to release the micro switch to operate the lever opening the holder jaws, which therefore are "dead."

A two-way selector switch for "normal" or "safety" and two connector sockets are fitted to the welding set panel to allow the safety electrode holder and contactor to be detached and used only as required when welding is to be carried out in dangerous situations. One contactor set and safety holder can be thus made available for a number of welding sets whenever its use is desirable.—*T. H. Snelson.*

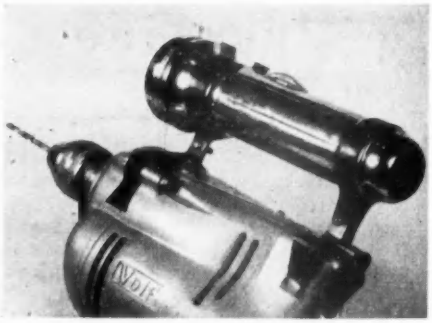
Lighting for Portable Drills

WHEN using portable drills inside tanks and other dark places, it is very difficult to light up the area in which the holes are to be drilled as a man has only two hands. Using a drill and a light he needs three.

We have overcome this trouble by fitting a light to the drill casing so that the actual drill point and the surrounding area have good illumination. The lighting means is an ordinary electric torch which is secured to the drill casing by means of simple clips bent up from springy steel, $\frac{3}{8}$ by $\frac{1}{32}$ in. section.



D.C. welding set incorporating safety switching



Torch in position on drill

The torch can be unclipped from the drill casing in a second, leaving the drill unencumbered. Dimensions of the metal clips will vary to suit various drill casings and torches.

The vibration of the drill does not have any ill effects upon the torch bulb. Care has to be taken to switch on the torch only when drilling or the batteries run down rapidly. We usually use a standard inspection lamp for general lighting of the work place and use the torch light for locating the drill point in the right place.—*C. T. Bower*, A.M.I.PROD.E.

Brush Pressure

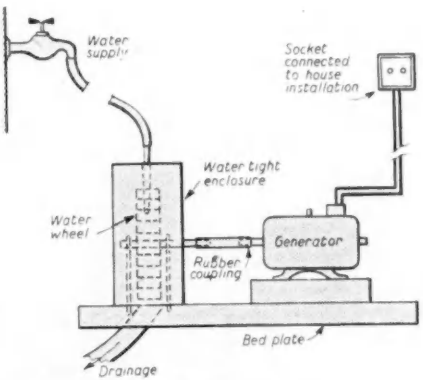
IN the note (June 19, 1952, issue) headed "Loose Ends" your correspondent says that "correct brush pressure is as important as a highly polished commutator or slipring" and suggests that a small spring balance should be available to check brush pressure as a matter of routine maintenance. This is a misleading statement, in the writer's opinion. The brush pressure used on any machine is decided by the machine designer as also is the grade of brush used, the designer using data supplied by the brush manufacturers. The designer's wishes are executed in the machine manufacturers' works by the fitting of correctly designed brush boxes and springs, and insertion of the grade of brush required. The spring pressure is thus fixed and while slight adjustment is arranged to take up the tension of a spring released by the wearing away of the brush, there is nothing to be gained by measuring the pressure during maintenance. It is far more important to ensure that the correct grade of brush is used (i.e. the grade fitted by the machine maker); the brush pressure has been taken care of once and for all.

While the brush pressure was of course of importance to the motor manufacturer, this note is to point out that even if the maintenance man is aware of the correct pressure for a given machine, which is very doubtful, there is no point in measuring the pressure, and that what he should do is to concentrate on (*a*) keeping a smooth true surface on commutator or ring and (*b*) fitting the correct grade of brush when replacing worn brushes. If a commutator or ring is rough or untrue no alteration of brush pressure can bring about good commutation or current collection, and when a wrong grade of brush is fitted the result is often that a previously smooth commutator or slipring surface is quickly roughened.—*R. A.*

Novel Turbo-generator

THE frequent interruption of our supply (110 volts a.c.) urged me to create the following simple generating set:

A 110 volts d.c. generator is direct coupled, by means of a $\frac{3}{4}$ in. diameter 4 in. long rubber hose, to a simple water wheel of the impulse type, fabricated from tin plates. The jet actuating this wheel is fed, through a flexible $\frac{1}{2}$ in. diameter rubber hose, from the local water supply. (400 ft head.)



Mains-water-driven generator

This piece of equipment gives complete satisfaction under a load of 100 watts. All that is necessary is to put off the outside mains supply switch and connect the rubber hose to a water tap. The installation of the house is made alive by the insertion of the two outgoing wires from the generator into the nearest available socket.

It happens at times that our village is in complete darkness while my house has all the brilliance that 100 watts can provide.—*A.S.Shammas.*

I.E.E. Summer Meeting

Members and Guests Enjoy Full Programme

GOOD weather contributed much to the success of this year's I.E.E. Summer Meeting, held in Dublin last week, at the invitation of the chairman and committee of the Irish branch of the Institution.

Guests at the reception at Iveagh House, left to right, Mr. B. O'Mongain (chairman of the Irish Branch I.E.E.), the Minister for Posts and Telegraphs, Mr. Erskine Childers, and Sir John Hacking

The last time Ireland had been selected as the venue for the meeting was as long ago as 1930, when the principal item of interest visited was the large Shannon hydro-electric scheme.

A good attendance was recorded, some 200 members and guests being present, and as usual a wide selection of works' visits and entertainment had been arranged for the party.

Proceedings really opened on Tuesday night, when an informal reunion and smoking concert was held at the Metropole Ballroom, O'Connell Street. Several people, however, chose to travel so as to arrive on Wednesday, and thus missed an informative and interesting lecture given by Dr. G. Little of the Old Dublin Society, who took as his topic "Dublin."

Works' Visits

A plethora of alternative visits had been arranged for Wednesday morning, catering for a variety of tastes. Some members chose the trip to the Aberdare Electric Co. Ltd. at Finglas and, after an interesting tour of the works, lunched at the Gresham Hotel; others with a taste for the open air went to the Electricity Supply Board's 110 kV station, also at Finglas. For those who were aeronautically inclined, the visit to Aer Lingus workshops at Dublin Airport was of interest, and finally, principally for the ladies and those whose interests lay in fields not covered by the works'

The members participating in a snack at the reception given by the Minister for Posts and Telegraphs

visits, there was a coach tour of the city environs, including a visit to the Zoological Gardens.

In the afternoon, two visits had been arranged, one to the works of A. Guinness, Son and Co. Ltd., which drew a remarkably high attendance to inspect the new power station, and to sample some of the output of this well-known firm, and the other to see the P.O. Telephone Exchange and Electricity Board load dispatch equipment, which attracted a small but enthusiastic gathering.

Generating Plant

Thursday saw the members *en route* to the two turf-fired power stations at Allenwood and Portarlington. On arrival at Clonsast, the party travelled by light railway to the bog to see the cutting and loading plant in operation, and after lunch split into two parties to examine the generating stations. The weather was somewhat showery at first but soon cleared up. In the evening an informal reception was held by the Minister for Posts and Telegraphs at Iveagh House.

The other principal station visited was

Mr. Erskine Childers greets Mr. and Mrs. A. H. Miller, of Portsmouth, while Capt. J. M. Donaldson looks on

Poulaphouca hydro-electric plant, which the members saw on Friday. Again the evening was occupied by a reception and dance at the Metropole Ballroom, this time given by the Electricity Supply Board.

So ended a most enjoyable visit, and great credit is due to the Irish section of the I.E.E. and the I.E.E. Headquarters staff, whose work did so much to make the meeting a success.

Steel Production in the U.S.

THE latest report issued by the Anglo-American Council on Productivity gives the findings of the British team which investigated the American iron and steel industry. This industry produces some 86 million long tons of steel per year compared with 16·3 million tons in Britain. As is to be expected, the report is mainly concerned with the detailed comparison of iron and steel techniques between the two countries, although a certain amount is devoted to electrical considerations. These are mainly to do with instrumentation and maintenance in rolling mills. At the moment there are about 105 heavy blooming and slabbing mills in America, with an average capacity of about 615,000 tons/annum. In this country, with the exception of Margam, the average capacity of the 63 heavy slabbing and blooming mills is about 225,000 tons per year.

The drive for most American mills is electric although a few steam drives still remain. In order to ensure rapid and accurate communication throughout the production lines, many means are used, including electro-mechanical telescribes for transmitting written messages, and, in one works, television technique has been put into practice.

Maintenance of the motors and control gear associated with such large mills naturally presents a major problem, and in some works the electrical department is completely independent and responsible for both design and maintenance, while in others the electrical section comes under the control of the maintenance superintendent—usually a mechanical engineer.

The report, unfortunately, does not give an overall picture of the maintenance systems adopted, but quotes one works where only motor repairs up to 500 h.p. were dealt with in the electrical repair shops. In this case, the whole motor was transported to the shop so that full testing could be carried out after repair. Local sections were established for maintaining and repairing control gear and starters. It is, however, mentioned that the high standard of reliability of American plant appeared to be due more to its efficient design and robust construction than to exceptionally good maintenance. In fact the quality of maintenance work generally did not appear to be equal to that found in the larger works in Britain.

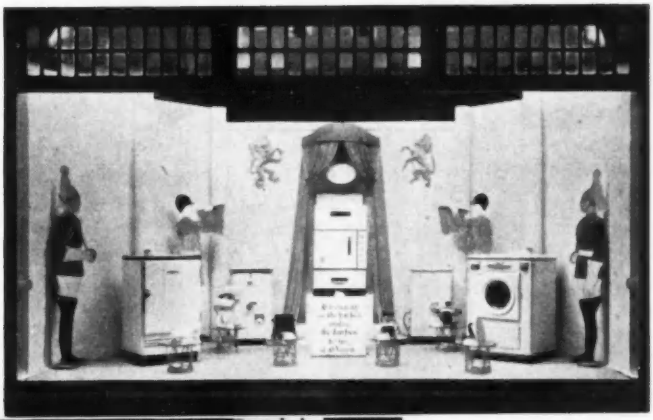
On lighting, the report remarks on the diverse trends between the two countries. In America, the tendency was to reduce natural light, while in Gt. Britain the reverse is the case.

The report is available from the Anglo-American Council on Productivity, 21 Tothill Street, London, S.W.1. Price 5s.

"—the Kitchen fit for a Queen"

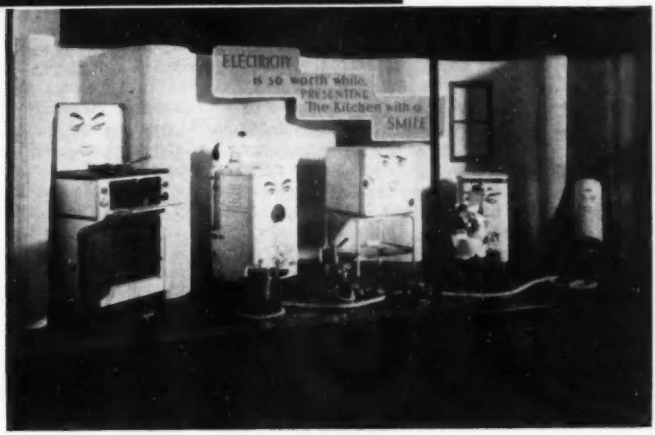
IS THEME OF WINNING DISPLAY IN L.E.B. WINDOW COMPETITION . . .

The second annual window competition, which was open to members of all Service Centres' staffs, took place in April this year. Of the 50 entries received the first three places were awarded to Walthamstow, Edgware Road and Baker Street service centres



The entries were judged by a panel of senior officers of the Board who selected 10 entries for submission to a final judging panel the members of which were Mr. Mischa Black of Design Research Unit, Mr. Marcus Bromwell of the Stuart Advertising Agency and Mr. Arthur Symes of "Display Design and Presentation"

At a meeting at St. Pancras Town Hall last week the Deputy Chairman of the London Electricity Board, Mr. E. A. Mills, M.I.E.E., M.Inst.C.E., M.I.Mech.E., presented the Shield and certificates to the winners. Walthamstow's display (top) showed that "Electricity in the kitchen makes the kitchen fit for a Queen" whilst (centre) Edgware Road with second place had the right idea for the impending holiday season and in the third place Baker Street believes that "Electricity is so worth while. Presenting the kitchen with a smile"



overseas news

Australian Prices Too High?

Deferring acceptance of tenders for 225 circuit-breaker panels for substations, 5/11 kV, Sydney County Council has decided to find out whether Australian manufacturers could quote prices more competitive with overseas firms. The lowest British tender for the equipment, that of A. Reyrolle and Co., was for £160,071, and the nearest Australian tender, by the Australian General Electric Co., was £237,145—a disparity of 48%. At its recent meeting the County Council was informed that in 1948 when similar tenders were called for Australian tenders submitted were 19.8% higher than those of overseas equipment, but in 1950 the disparity was of the order of 31%, although the British tenders allowed for freight charges and the difference in the exchange rate.

More Rates Up

The State Electricity Commission of Victoria has this month raised its charges to domestic consumers by about 12½%, and to commercial and industrial users by approximately 25%. This overall increase of 20%, to apply to S.E.C. consumers throughout the State, is the greatest single increase made by the Commission since 1945. The commission is also raising by 25% its charges for bulk electricity supplied to a number of municipal councils. To the Melbourne City Council alone this will mean a further £250,000 revenue to find.

Atomic Power

South Australia may be using atomic energy to power her factories by 1965, according to the address read at the opening of Parliament at Adelaide last week by the Lieutenant-Governor, Sir Mellis Napier. He said that existing and immediately proposed power sources were expected to meet requirements until that date, by when it was believed that the technical problems of using atomic power for industry would have been solved.

Offers in Manitoba

Replying to the Manitoba Government's recent requests for terms upon which the development of any or all of four specified hydro-electric sites would be undertaken, the Winnipeg Electric Co. has intimated that it could secure the necessary capital and is prepared to go ahead and assume full responsibility for future development, if it can be assured of long-term leases together with "terms and conditions that would assure a fair rate of return on the investment capital required for such development." The City Hydro too has offered to develop the Nelson River sites, asking for the safeguards of security of tenure (a 50-year lease) and for an assurance that until power from that source was fully utilised, no other power developments would be started by anyone in Manitoba. An early discussion on the matter by the Provincial Government is expected.

Seaway Power Scheme

The Canadian and United States Governments on Monday last applied to the International Joint Commission for authority to develop the power works of the proposed St. Lawrence seaway and power project. Granting of the application would clear one of the last legal obstacles to this seaway to link the Atlantic estuary of the St. Lawrence with the Great Lakes for ocean shipping. Permission is now sought for the hydro-electric development at a cost of $400m. (over £146m. sterling). Canada has reiterated to the Commission its intention of acting alone to build the navigational part of the seaway, at an estimated cost of $300m. (about £107m.) simultaneously with the power scheme.

Higher Costs

Increased power charges to both municipalities and rural consumers at the beginning of 1953 were foreshadowed last month by Mr. R. H. Saunders, chairman of the Hydro-Electric Power Commission of Ontario. Some increase in the rates would be necessary if the Commission was to maintain its sound financial position, and although no idea of the amount of the proposed rise was given, he stressed that domestic consumers would still get supplies at an average lower than that prevailing in 1938. The reason for the increase he put down chiefly to higher wage rates and the extra use of steam power generation. Mr. Saunders revealed that steam power would represent about 24% of the cost of power in 1953, compared with less than 1% in 1951, was it any wonder that Hydro were pleading for the St. Lawrence power development, he added.

Congo Station

The new hydro-electric power station at Tshela, near Bakwanga, in the Belgian Congo, is expected to be in operation by the end of this year. Work began in 1949, and now all buildings have been completed and the second of four horizontal turbines is being installed. These sets, of 2,500 kW capacity, were manufactured at Charleroi. The remaining two units will be added as required. From the station a 50 kV line will supply Bakwanga, the centre of the diamond industry. Total cost of the scheme is estimated at 1,254 million francs.

Steam and H.E. Stations for Bombay

A new 100 MW steam power station is to be built at Trombay Island, 8 miles from Bombay, by the Tata companies. The first stage, of 50 MW, is to be completed by 1956, and the second stage by about 1959. This project has been entrusted to Tata's by the Government of Bombay following Delhi's refusal to finance the project. (The State Government had asked Delhi to provide at least 75% of the Rs.120 million needed). A repeated plea was made by the State Government of the urgent need to augment the present power supply by the hydro-electric system in view of the increasing demand. The previous government in Bombay had decided as a long-term policy, to nationalise hydro-electric systems and be responsible for future expansion. The present State Government, it is now reported, has temporarily decided, in view of financial stringency, to leave the expansion of the power industry to private enterprise. In pursuance of this policy, the Government of Bombay has agreed to extend the licence period of the three existing Tata concerns generating power in the Bombay-Poona-Igatpuri region up to 1975. The present period of licences of the three concerns were due to expire in 1956, 1957 and 1970 respectively. The Tata concern offered to construct and operate the Trombay thermal power station if the licences of their existing companies were granted up to at least 1970. That concern has also offered to expand their existing hydro-electric projects to produce an additional 65 MW. This power expansion programme consists of further developing the Kundalika River by the construction of a new power station below the existing Ghira plant, 80 miles from Bombay. It should be completed in four years.

Dunedin's Loss

Units sold by the City of Dunedin Electricity Department during the year ended March 31, 1951, amounted to over 165 millions, an increase of 5.08% —indicative of the impact of power restrictions which were re-introduced during the period—it is shown in the annual report, just received. Wairpori Nos. 1 and 2 stations, which the department operates, generated 86.6 million units, compared with 88.7 millions in the previous year; so that a larger bulk supply had to be taken from the State Hydro-Electric Department's system. Domestic supplies took 97.4 million units, compared with 92·8 million for the previous year, providing an average revenue of 0·4675d. and 0·4735d. p.u., respectively. A further 794 consumers were connected in the year, bringing that total to 31,107. On the financial side, there was a surplus of £173,800 before providing for interest, capital charges etc., but after making those allocations, the result was a net loss of £23,599. But tariffs have now been increased and it should be remembered that the payment of interest on the new development works at Wairpori will continue to have an adverse effect on the yearly operations until the new plant becomes revenue producing.

Auckland Looks Ahead

Within five years the Auckland Electric Power Board, N.Z., expects to double its sales of power—selling 1,000 million units by 1958. So stated Mr. N. M. Speer, general manager, at the board's annual meeting recently. Already the Board has 90,000 consumers—80,000 of them with domestic installations. He pointed out that manpower was the most serious problem facing the board in its expansion. This and the materials shortage were holding back progress. By next October the Board must be able to handle the extra load available from the new Maraetai hydro-electric station without imposing local restrictions caused by the inadequacy of the board's distribution system, and here, Mr. A. O. Glasse, chief engineer, stressed that the £250,000 spent on the system last year would have to be doubled, for much of the existing equipment was becoming old, causing increased maintenance work.

Brazil's Programme

To finance electrification schemes in Brazil, the Export-Import Bank has granted a loan of over $41 million. The schemes are part of Brazil's development programme (the Vargas Plan), and the money will be utilised by seven local power companies, which are indirectly subsidiaries of an American investment concern, to add a further 175 MW of generating plant (about 90% of their present output). The seven companies serve areas in the states of Sao Paulo, Minas Gerais and in the north and north-east. The major portion of the loan will be spent on buying new generators and equipment in the United States. Well over half the expansion schemes to be undertaken by these companies, including a new 80,000 kW hydro-electric power station to be built in Minas Gerais, involve the use of water power. This expansion plan alone calls for an eventual expenditure of over $98m.

Progress at Malta

Work on the construction of Malta's new steam power station is now progressing well. Underground excavations under Jesuits Hill have been completed to house the plant on order, and to take care of future possible extension, and now work is well advanced on the erection of the first of three 70 k lb./hr boilers. A 250 kW diesel house set has also been installed to assist during the construction work. The existing vaults have been transformed into lofty and lengthy chambers, one of which will house the three 6,000 kW turbo-alternators, transformers, etc., while another will accommodate the boiler plant. In these chambers false roofing has been erected to prevent seepage of water. Culverts have also been cut for the supply of sea water for the cooling system; and concrete-lined tanks constructed to serve for oil fuel storage. Funds to meet expenditure on this new station have been provided by the Economic Co-operation Administration, and most of the plant was ordered from the U.S. in 1950. The consulting engineers for the scheme are Preece, Cardew and Rider.

PERSONALITIES

IN THE INDUSTRY

At the annual conference of the Electrical Contractors' Association which opened at Eastbourne on Tuesday, **Mr. W. H. Trace,** managing director of W. H. Trace and Son, Ltd., of Birkenhead, was inducted as President of the Association for the ensuing year. He became a member of the E.C.A. in 1931 and served as honorary secretary of the Liverpool branch for seven years, of which branch he is also a past chairman. He has also been active on the Northern and North-Western Counties sectional boards for a long time, for six years as honorary secretary. He was elected to the Council of the Association in 1942, and became vice-president in 1950.

Mr. W. H. Trace

The United Steel Companies Ltd. announce that **Mr. H. E. Wright** retired from the position of general manager of their Steel, Peech and Tozer branch at Rotherham on June 30. Mr. Wright joined the company 38 years ago at their Appleby-Frodingham branch and has been with Steel, Peech & Tozer since 1925. He is remaining with the United Steel Companies Ltd. in a consultative capacity, and will continue to serve on the Boards of the associated companies of which he is at present a director. In addition, he is to supervise the development of commercial research at the Head Office. **Mr. Andrew Jollie,** who was general works manager, succeeds Mr. Wright as general manager of Steel, Peech and Tozer, and **Mr. G. E. D. Halahan,** who was chief labour superintendent of the United Steel Companies, succeeds Mr. Jollie as general works manager.

The end of last month brought the retirement of **Mr. V. L. F. Davis,** A.M.I.E.E., from the post of deputy station superintendent at Stoke generating station, Midlands Division, B.E.A., after 40 years service in the Industry. Mr. Davis, who was educated at the North Devon School, Barnstaple, was an articled pupil with the Barnstaple Corporation and afterwards served with the Newcastle-on-Tyne Electric Supply Co. In 1914 he joined the staff of the Stoke-on-Trent Corporation and was transferred to the staff of the North West Midlands Joint Electricity Authority on its inception in 1930, and in 1948 was appointed to the position from which he now retires.

Sir Walrond Sinclair has resigned from the chairmanship of the India Rubber Gutta Percha and Telegraph Works Co. Ltd., and is succeeded by **Sir Eric Mieville.**

After 50 years' service with the electrical industry of Italy, Gt. Britain, Australia and New Zealand, **Mr. H. E. Taylor** has retired from the position of managing director in New Zealand for the British General Electric Co., Ltd., which he has held since that concern was formed in 1936. Mr. Taylor was also the first president of the N.Z. Electrical Federation. He started with the General Electric Co., in London, in 1907 and transferred to Australia in 1912, where he was later appointed manager of the company's branches in Victoria, South Australia, and Tasmania. He went to New Zealand as manager of the branch there in 1923. His successor is **Mr. S. C. Brown,** B.Sc., M.I.E.E., who graduated at Manchester University, and later served with A.E.G. in Berlin before joining the General Electric Co., in England, with whom he spent several years at Witton before going to New Zealand as engineer to that organisation. There, he was appointed assistant managing director in January, 1950.

Gillott Electro-Steam Cookers Ltd. have appointed **Mr. D. D. Slaney,** of 30 Haselor Road, Sutton Coldfield, Warwicks (Tel. Sutton Coldfield 1417) to represent them as sales and technical representative in the Midlands area; **Mr. Frank Hampton,** of 35 Adversane Road, Worthing (Tel.: Worthing 5400), as their sales and technical representative for Kent, Sussex and the Southern Area. **Mr. J. D. Robertson,** A.M.I.E.E., 24 Birch Grove, W. Acton, London, W.3 (Tel.: Acorn 7459) will in future confine his activities to the London area.

Divisional chief engineer (electrical and mechanical) to the Durham Division of the National Coal Board, **Mr. H. Watson-Jones,** M.Eng., M.I.Mech.E., M.I.E.E., M.I. Min. E., has been elected president of the Association of Mining, Electrical and Mechanical Engineers for the 1952-53 session. He has been with the N.C.B. since January, 1947, originally as chief mechanical and electrical engineer of the North Western Division till that division was split in July, 1950, when he took up his present post. Earlier he had been head of the Mining Department of Metropolitan-Vickers Electrical Co. since 1939 (with whom he served a post-graduate college apprenticeship), after a period with the American Westinghouse Co., and as manager of the Birtley Co. Ltd., Co. Durham.

Mr. H. Watson-Jones

Previously district commercial engineer at Purley to the South Eastern Electricity Board, **Mr. H. C. Poore** is transferring to a similar position at Croydon in succession to **Mr. L. G. Pattison,** who is shortly flying to Nairobi to join the East African Light and Power Co. Ltd., as we earlier reported.

Next month **Mr. A. L. Green** completes 50 years' active service as assistant secretary to the North Western centre of the Institution of Electrical Engineers—a noteworthy record. During that long period he has always been a willing source of help to officials and all associated with the centre and many older members who have left the district may wish to join in a presentation to be made to Mr. Green at the opening meeting of the next session on October 7.

Mr. B. L. Bisgood, who has been a director of Brown Brothers since 1932, has been elected chairman in succession to the late Mr. J. A. Thomson. **Sir Richard Yeabsley,** F.C.A., has been elected deputy-chairman; and **Mr. J. T. Masterton,** previously joint managing director, is now managing director.

For the Central Sussex district in the Mid-Sussex Sub-area of the South Eastern Electricity Board, **Mr. Arthur Barnes,** M.I.E.E., has now become the district manager. He was formerly the deputy there under **Mr. A. M. Harker,** M.A., F.C.C.S., who is the deputy sub-area manager, and who has now taken over the duties of district manager of the Brighton and Hove district in addition.

Mr. R. A. Smith, managing and governing director of Lowdon Bros. and Co. (Engineers), Ltd., Dundee, has been appointed president of the Electrical Contractors' Association of Scotland, for the ensuing year.

We learn from Aron Electricity Meter, Ltd., that **Major-General J. L. P. Haines,** C.B., C.B.E., has accepted the post of managing director of the company. Major-Gen. Haines has had a distinguished military career, during which he held many responsible appointments. In addition he has occupied important technical and administrative posts with the War Office and Ministry of Supply, which particularly fit him for the duty he now assumes. He received military education at the Royal Military Academy, Woolwich, and was commissioned in the Royal Garrison Artillery in 1916. In 1927 he entered the technical sphere and in the years before the last war held a number of armament inspection and design appointments in Woolwich Arsenal. During the war he held a number of technical and administrative posts in U.S.A., Canada and U.K., culminating in his appointment as President of the Ordnance Board, Ministry of Supply, which appointment he vacated in February, 1952, on his retirement from the Army.

Major-General Haines

G. Hopkins and Sons, Ltd., announce that **Mr. A. Graham Ashton** has been appointed a director of the company.

The new manager of Mazda lamp and lighting advertising for the British Thomson-Houston Co., Ltd., is to be **Mr. Oliver W. J. Farmer.** He will succeed Mr. H. E. Goody who, as we have already announced, is to retire at the end of this month. Mr. Farmer joined the Mazda Advertising Department in December, 1945, and became deputy manager of the department in November, 1948.

Mr. O. W. J. Farmer

Philips Electrical, Ltd., have appointed **Mr. P. A. Ballard** as their Philishave sales manager. He joined the company in April, 1951, and latterly was sales promoter for Philishavers in their Cardiff branch area.

Mr. A. E. H. Boaz has been appointed manager of the Falmouth Depot of the Marconi International Marine Communication Co., Ltd., in succession to the late **Mr. C. J. A. Gill.**

The United States Department of Commerce, Washington, announces that **Mr. Richard W. Cotton,** who is a vice-president and director of Philco International, Philadelphia, has been appointed director of the electronics division and chairman of the Electronics Production Board, Defense Production Administration. Mr. Cotton resided in this country from 1934 to 1946 and was for some years managing director and chairman of British Rola Ltd.; during the last war he was Controller of Signals (Communication), M.A.P. After the war he was for some time managing director of British Philco, and at the present time he is a director of Philco (Overseas) Ltd., London.

Mechanical engineer, at Nuneaton, to the East Midlands Electricity Board, **Mr. B. Foreman** was recently presented with a cheque by Mr. J. Billcliff, district manager, on behalf of colleagues, to mark his retirement. Mr. Foreman went to the Nuneaton Electricity Works in 1928 as power station superintendent, and became mechanical engineer there when the station was closed during the last war, being then responsible for the rotary convertors and other plant.

The Electricity Committee of Belfast City Council has now agreed to a recommendation that **Mr. R. P. Watson,** B.A., B.A.I., M.I.E.E., be appointed

acting city electrical engineer for a period of 12 months (to which we referred last week), in succession to **Mr. W. J. McC. Girvan,** who proposes to retire at the end of September. The Committee recommends that the position should be reviewed at the end of 12 months from October 1. The commencing salary for the post of city electrical engineer will be £2,300 p.a. This decision is subject to the approval of the city Council, which meets this week.

Mr. T. A. Higgins, ASSOC.M.C.T., A.M.I.E.E., has been appointed manager of the Electrical Department of the Expanded Metal Co.'s West Hartlepool Works, following the resignation of **Mr. A. J. Franklin.** Mr. Higgins, who received his technical education at the Manchester College of Technology, served his apprenticeship with Metropolitan-Vickers Electrical Co., Ltd., and was for some years attached to the Industrial Control Gear Department of that company. On leaving M.-V. in 1937, he spent some time with the General Electric Co., Ltd., and Wilfred Frances and Co. on the design of motor control gear, later joining Ferguson Pailin, Ltd., with whom he was associated for a number of years in the Sales and Engineering Departments on e.h.t. and l.t. switchgear. He joined the Electrical Department of his present company in 1948 and was appointed assistant manager in 1949. Mr. Franklin's services will still be available to the company in an advisory capacity.

Mr. T. A. Higgins

In the North Western Division of the B.E.A., **Mr. H. W. Walker** has been appointed power-station superintendent at Kendal, where he held the position of operating engineer since March, 1949. He has been associated with diesel plant throughout his long career with the industry, and from 1914 to 1916 was shift charge engineer at the G.E.C. power stations, Funchal, Madeira. In 1920, he held a similar position with the Kendal Corporation before becoming operating engineer.

Mr. Vernon Young, who was previously a special director of International Combustion (Holdings), has now been appointed a full director of the company. He is also chairman of Riley Stoker Co. and is on the London transfer committee of Aberdare Cables Africa.

Due to retire next week from the position of station superintendent at Kirkstall power station of Yorkshire Division, B.E.A., is **Mr. J. F. Sarvent,** A.M.I.E.E. He went to Kirkstall from the old Newcastle-upon-Tyne Electric Supply Co., as resident engineer when the station was constructed over 20 years ago for Leeds Corporation and has been chief there ever since.

NEW LITERATURE

Laxton's Builders' Price Book

MANY electrical contractors have found this hardy annual of considerable help in the past in assessing prices of many classes of work in the building and contracting industry, and this, the 125th edition, again providing a wealth of information which has been brought up to date, will be equally welcomed by the trade. Explanatory details are given of the basis upon which the prices listed are built up, with an indication of the percentage variation applicable resulting from a change in the basic wage rate. The electrical section alone is quite extensive, and should provide a ready guide to the prices of various articles in general use. To complete the volume are tables of weights, etc., and lengthy lists of firms and brand and trade names. Published by Kelly's Directories Ltd., 940 pages. 7⅛ in. by 4⅝ in., price 30s.

Electrical Engineer's Reference Book

edited by E. Molloy

APPEARING in its sixth edition with some important additions and revisions, this volume is now well established as one of the standard reference books for the electrical engineer. New articles for the present edition include a survey of street lighting recommendations, electrode boilers, electrolytic production of hydrogen and oxygen, and electronic developments. Articles on electricity in automobiles and on road traffic signalling have been entirely rewritten. In the main, however, the publication retains its proved form, and its value both to practising engineer and to student cannot be doubted. Published by Newnes. Sixth edition, price 63s.

BOOKS RECEIVED

Electrical Measurements, by F. K. Harris. Handbook on principles and application for d.c. and low frequency work. Published by Chapman and Hall. 784 pages, 9 in. by 6 in. Price 64s.

Small Commutator Motors, by K. C. Graham. Practical notes on construction, maintenance and repair. Published by The Technical Press Ltd., 283 pages, 8¼ in. by 5½ in. Price 40s.

Automatic and Manual Control, ed. A. Tustin. Papers contributed to the Conference on Automatic Control organised by D.S.I.R. in 1951. Published by Butterworths Scientific Publications, 584 pages, 9¾ in. by 7 in. Price 50s.

Modern Lighting Technique, by H. Hewitt. Textbook for intermediate examination of City and Guilds. Published by Edward Arnold, 215 pages, 8½ in. by 5½ in. Price 21s.

The BUYER'S *Column*

Dry Air Production

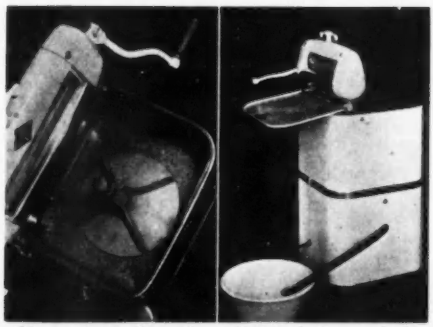
IN many processes a supply of dry air is required. Where the actual volume required is not unduly large, the foot-operated desiccator, produced by the MAGNETIC EQUIPMENT CO., Lake Works, Wicor, Portchester, Hants, will be found most suitable. The equipment consists of a heavy duty foot pump fitted with suitable non-return valves and with a pressure gauge. The air itself is dried by passing it through a silica gel drying bed. When the silica gel becomes saturated it can be reactivated by drying out in a hot oven. The silica gel canisters are easily removed and replaced. An electrical application for which these units are suitable is the pressure testing of cables after jointing.

Immersion Heaters

IMMERSION heaters, so designed that the heating element can be bent to suit awkward tank positions, are being produced under the title "Duo-coil" by GILLOTT ELECTRO STEAM COOKERS LTD., of Cotswold Works, Chalford, near Stroud, Gloucestershire. These are made in four sizes with a standard loading of 2·5 kW. The lengths are 14, 23, 29 and 35 inches and the prices £3 15s. 3d. (P.T. £2 15s.), £3 17s. 6d. (P.T. £2 16s. 9d.), £4 6s. (P.T. £3 2s. 11d.), and £4 16s. (P.T. £3 10s. 2d.) respectively. All models are fitted with thermostatic control and are fully suppressed for radio and television interference.

The "Cobra" Junior Washer

FROM the OSBORN MFG. CO. LTD., Highgate Square, Birmingham 12, comes a new small electric washing machine designed to appeal to the overseas buyer. Special features include soap economy, low electrical consumption, convenient dimensions (16 in. wide by 29 in. high) and an agitator mechanism allied to a particularly smooth contoured interior. All working parts are of die-cast alloy to ensure complete freedom from rust. At the moment the "Cobra" Junior electric washer is designed for use on all normal voltages on a.c. electric mains. Full details, price lists and showcards can be obtained on application.



These views show the agitator design and the general appearance of the washer

A Flameproof Thermostat

ALTHOUGH the use of compressed air in mines and in dangerous atmospheres is generally accepted as safe, certain conditions can arise where the compressor itself can overheat causing substantial rise in the temperature of the compressed air which is followed by conditions in the airline or receiver which may form a hazard.

A general view of the thermostat and phial

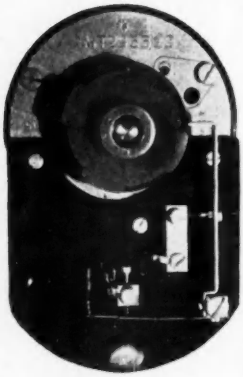
In order to avoid these conditions and to prevent damage to the compressor the ELECTRICAL APPARATUS COMPANY of St. Albans have designed a special version of their flameproof thermostat. This comprises a wall or bracket fixing flameproof enclosure which houses the thermostat switch itself, the latter being operated by a temperature sensitive phial and capillary tubing system. The phial is inserted in the pipe line as close to the compressor discharge as possible and a dial thermometer gives a visual indication of the discharge temperature.

A convenient method of varying the tripping value is provided, although to prevent unauthorised adjustment it is necessary to remove the main cover after isolating the supply.

The thermostat embodies an airbreak butt-contact type normally closed switch with magnetic assistance to give a snap action. Several standard ranges are available and the normal air temperature at the compressor discharge point should be given when ordering. The thermostat switch is of course inserted in the compressor motor starter or circuit breaker "stop" control circuit.

Flashing at Zebras

ANTICIPATING the requirement for a flashing light at "zebra" crossings, VENNER LTD., of the Kingston By-Pass, New Malden, Surrey, have after considerable experimentation, designed the Venner Zebra Switch.



The Zebra Switch

The control unit, illustrated in the accompanying photograph, is driven by a high-torque synchronous motor consuming only about 1½ watts, and opens and closes a pair of contacts at the required intervals. The unit is of "plug-in" design to ensure easy and immediate replacement should this ever be found necessary.

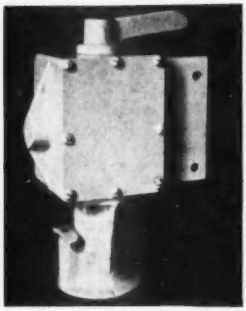
A cast metal case has been specially designed for mounting on the top of existing beacons, and has sufficient space for accommodating, in addition to the flasher unit, either a syncronaes or electrically wound spring reserve time switch and double-pole fuses.

Magnetic Inks for Flaw-finding

MAGNETIC methods for crack detection in ferrous metals have been used for many years. The success of the method is, however, dependent on the quality of the "ink" used. One of the difficulties is to ensure that the pigment consisting of a metallic powder, will not readily cake and will also remain in suspension for long periods. Manchester Oil Refinery are producing a range of "Supramor" electro-magnetic flaw detection inks in black, red, yellow and white which with their various grades can cover practically all normal requirements for flaw detection. Technical information on the subject can be obtained from the Technical Development Department, MANCHESTER OIL REFINERY LTD., Twining Road, Trafford Park, Manchester 17.

New Gearbox for "Apex" Washers

MANY pre-war American "Apex" electric washing machines are still operating in this country and the APEX ENGINEERING CO. of 116 and 118, Camp Road, Leeds, who make a speciality of repairing pre-war American and Canadian machines, have had many of this type returned for repair. One of the components hitherto unobtainable in this country has been the wringer gearcase which in the original machine was a zinc alloy diecasting. A great many machines are, it is thought, out of action due to fracture of this casting. Now, however, the Apex Co. has produced a replacement gearcase in cast iron which is much stronger than the original diecasting. The new case is a direct replacement and entails no modification to the machine. The price of the gearbox complete is provisionally fixed at £12 10s. less a trade discount of 20%.



Cast iron gearbox for Apex washer

It should be noted that the Apex Electrical Engineering Co. has no official connection, whatsoever, with the makers of the Apex washer, the similarity in name being coincidental.

TRADE PUBLICATIONS

SIGNAL POWER.—Automatic Telephone and Electric Co., Ltd., have published a reprint from the "Strowger Journal" entitled "The Theoretical Determination of Signal Power Required for the Ripple Control of a Network." It outlines the method of calculating the required power from a theoretical consideration of the circuit network taking as an example that of the Chester district in No. 3 Sub-Area, M. and N.W.E.B.

ELECTRICAL ENGINEERING.—Eight new publications have been issued by the English Electric Co., Ltd., Queens House, Kingsway, W.C.2. They deal with quick-break knife switches, 200 b.h.p. "Package" type drilling rig unit proving tests, air circuit-breaker high-voltage excitrons, mercury-arc tubes, 25 kW induction heaters, control and relay cubicles and a.c. ammeters and voltmeters of the moving-iron type.

ELECTRIC FIRES.—A new specification sheet featuring the range of Creda electric fires is now available from Simplex Electric Ltd., Broadwell, Oldbury, Birmingham.

LABORATORY SPECIALITIES.—This is the title of Catalogue No. 16B-S just issued by Griffin and Tatlock Ltd., Kemble Street, W.C.2.

SOUND SYSTEMS.—Systems for amplification and distribution of sound are described in Publication 1160 issued by Communication System Ltd., Strowger House, Arundel Street, W.C.2.

INTERCOMMUNICATIONS.—A money spinner, which saves time and money, is the description given to A.T.M. telephone systems in a recent leaflet issued for Communication System Ltd., Strowger Works, Liverpool.

TRAFFIC SIGNALS.—Electromatic vehicle detectors of the flat strip (f.s.) type are described in a brochure on electromatic vehicle-actuated traffic signals issued by Automatic Telephone and Electric Co. Ltd., Strowger Works, Liverpool.

E.R.A. REPORTS

Information on Transformer Cooling and Welding

INFORMATION on the mechanism of cooling in oil-filled transformers is again prominent in a batch of technical reports released for publication this month by the Electrical Research Association. There are two reports dealing with the subject, the first being Q/T117 —"Temperature gradients in transformer windings and rates of oil flow in transformer tanks: a critical review of published information," by Mr. B. L. Coleman, B.SC.

The treatment in this report is largely mathematical, and five separate problems are considered. In order they are: temperature distribution in windings and cores, oil flow characteristics, convection in oil, cooling characteristics of oil, and cooling ducts. A particular feature of the treatment adopted is the examination of the approximations usually made to simplify the solution of the equations that are developed in this work.

In his conclusions, the author points out that in general it is necessary that existing theories on the subjects discussed should be tested by experiment before deeper analysis is attempted; published results are few. Temperature gradients appear to have been little investigated, and not much can be said on the subjects of temperature distribution and of oil velocity. There is also a surprising lack of quantitative information on cooling ducts.

Outdoor Transformers

"Operation of naturally cooled outdoor transformers as affected by weather and surroundings" is the title of the second report. Prepared by Mr. M. R. Dickinson, B.SC. (ENG.), as a preliminary review of the subject, it is issued as report Q/T118. The effects of sun, wind, rain and other weather conditions on the operation of transformers mounted outdoors is discussed in the light of published information, and use is made of calculations for three specimen transformers to obtain rough numerical information as to these effects.

The conclusions reached as a result of this work are largely negative. It is suggested by the author that from the information obtained, weather conditions need hardly be considered from the point of view of transformer life. Considering small transformers such as are used in distribution networks, for example, it is stated that if a transformer be loaded so that its hot-spot temperature is 95° C under certain weather conditions (say bright but cloudy, no wind, rain or fog), then strong sunshine persisting for several hours can increase the hot-spot temperature. The slightest breeze, however, will counteract the effects of even the strongest sunshine.

For small transformers some benefit may, of course, be obtained by painting the tank in a light colour such as white.

Welding

An important addition to the list of welding investigations reported by Messrs. L. H. Orton, PH.D., F.,INST.P., and J. C. Needham, B.SC. (ENG.), is Z/T82, "The a.c. argon arc process for welding aluminium." This is concerned with the oscillographic analysis of the effects of welding transformer open-circuit voltage on arc re-ignition. It has been found that the arc re-ignition process for the reverse polarity half-cycle is very complex. In general, there is a series of "ignition oscillations," each cycle of which lasts some 10 microseconds, and is repeated some 10 to 50 times before the arc is finally established in the half-cycle.

The experiments discussed in the report have shown that the use of an h.f. spark injector when welding aluminium or its alloys by this process permits a drop of about 60 V in open-circuit voltage below that required for a self-maintaining arc. If a series capacitor is inserted, a reduction of about 15 V is possible. Surface condition of the work plate, as well as its material. are found to have a marked effect on the voltage required.

It is pointed out that the addition of h.f. injection does not primarily stabilise the arc for if the arc is once established in any one half-cycle it continues to burn to the end of that half cycle, whether h.f. sparks are present or not. If, however, at the lower open-circuit voltages, sparks are used to break down the gap, subsequently leading to arc formation, no further sparks are required for that half-cycle. This explains how an h.f. spark oscillator of only a few watts mean power can "stabilise" an argonarc of the order of one kW.

Under optimum conditions the argon arc was successfully maintained on a 5% magnesium-aluminium alloy with an open circuit voltage as low as 45 V r.p.s.

The WEEK in NEWS

Sales Decline May Delay Tariff

Board Chairman warns of Loss in Current Year

INTRODUCTION of standard commercial and farm tariffs by the East Midlands Electricity Board is to be delayed, announced Mr. C. R. King, the chairman, last week. Addressing the consultative council, he said that he wished to wait until the end of July or August, when he would have a better idea of costs. Sales were already dropping, and he preferred to face a further deficit rather than increase tariffs prematurely, and so jeopardise sales.

Reviewing sales, he said that a falling away was first noticed in December, and since then it had continued. In March sales were 380m units, compared with 390m in 1951; for April the figures were 331m and 353m, and in May, 328m against 338m the year before. May returns were not as bad as the preceeding months which may indicate that the slump is a temporary one. If the depression continued on its existing scale, there would be a total drop in gross revenue of something like £2m. For the financial year ended March 31, 1952, the Board would have a substantial deficit, and a heavy transfer from the reserve account would be necessary. Wage increase demands which were being presented to the board would, if conceded, cost an extra £330,000 in a full year. In addition there were other increases to be faced —postage charges, he instanced, had cost the Board £50,000 in a year.

Action was being taken to defer wherever possible, spending on revenue account, and strict supervision of establishment was being exercised. During March and April 6,631 consumers and 147 farms had been connected to the supply.

Ald. W. Lewis, chairman of Midlands Board, also speaking in the same vein last week, said that the decline in demand for electricity had extended to the Birmingham area and revenue was likely to be down by £500,000. Present tariffs would remain for six months, he said, and it was hoped it would not be necessary to raise them. If prices remained stable, no deficit was likely at the end of the financial year. The chairman added that the Board hoped demand would pick up again soon, but figures for May were not encouraging.

FORWARD COPPER SALES ALLOWED FOR AUGUST

THERE is to be no embargo on copper sales for August delivery, it has been announced by the Ministry of Materials. The statement reveals that arrangements whereby consumers can buy up to their full quotas for the current month and one month forward will remain unchanged.

Following the recent price uncertainty (see our issues of June 19 and 26), the Ministry thought that some modification of the selling arrangements might have to be made. Forward sales were suspended for a short while last month.

CONSUMERS ASK THAT UNIT RATE BE NOT CHANGED

AS reported previously in these columns, the B.E.A. is to review and report on conditions in the South Western Electricity Board's area. Consumers are seeking outside financial help for their sparsely populated and rural area. Told about the appointment by the Authority of a panel to examine the case, the Area's Consultative Council has passed a resolution asking that no steps be taken to increase the unit rate in the standard tariffs until the panel's recommendations are made known, or until the end of the present financial year, whichever was earlier.

The resolution also expressed concern over information that the Board, through circumstances outside its control, was shortly to incur increased costs estimated at £573,000 in a full year, £80,000 of which arose through the new rating formula. It endorsed the Regional Board's refusal to accept the formula on the grounds that the rates levied mainly on capital values imposed a further handicap to the area, where the ratio of revenue to capital was inevitably the lowest in the country. Tariffs were increased by an average of 11½% last August and the new charges had not stood their test, the resolution added.

The First Half-Century

Mistakes will happen even in the best-regulated concerns. On a section recently added to an electric tramway system that shall be nameless the gauge was made a trifle narrow at one place. A car zipping along at a good speed expressed its disapproval by retiring from the track and planting itself in a garden. At another part of the same section there is a curve. The tracks here have been laid so close together that cars attempting to pass at the sharpest point scrape several coats of pain off one another, to put it mildly. *From our issue of July* 3, 1902.

Rural Supplies in Highlands Too Expensive

LOCAL authorities in the Highlands are still not satisfied that everything possible is being done to make supplies of electricity to isolated communities as cheap as practicable. At last week's meeting of the local authorities' H.E. General Committee, a further series of complaints was put forward, and as a result the matter is to be taken up again with the North of Scotland H.E. Board. It was alleged that in some cases householders were being asked to guarantee £3 per room before they could be supplied with electricity.

One member declared that a householder was asked to pay £400 for a supply to be laid and then, in addition, had been told she must pay over £50 as a guarantee. A plea that the Board should waive the guarantee was made on the grounds that it was unfair to ask those who had gone to the trouble to modernise their premises in anticipation of electricity should be asked to ensure a substantial sum according to the size of their homes.

The committee chairman explained that distribution costs were proving larger than anticipated. He saw no alternative at present. He referred to possible developments in connection with the use of peat-gas turbines for generating electricity.

Board of Arbitration to Settle Durham Closed Shop Dispute

THE Minister of Labour, in accordance with requests from Durham County Council and Joint Emergency Committee of the Professions (interested parties in the current "closed shop" dispute) has been asked to appoint a Board of Arbitration in an endeavour to settle the controversy which has been going on now for well over a year. Both parties have undertaken to accept any award which the Board makes.

It has been agreed by both parties that professional employees involved should not be required to belong to a trade union or professional organisation as a condition of employment. On this undertaking the Board of Arbitration's terms of reference will be briefly to consider whether existing regulations of the county council which require applications for extended sick pay through a union or professional body should be withdrawn or not. The council is to suspend the operation of the regulation which had caused the dispute.

Eirean Bill to Ban Restrictive Practices

EIRE'S Restrictive Trade Practices Bill had its introductory reading in the Dail last week. It proposes to establish a Fair Trade Commission which, either on its own initiative or at the request of supply and distribution trade associations, would prepare and publish rules representing fair trading conditions. Notice of the Commission's intention to make rules would be published, and persons wishing to do so may make representations. Infringements would be reported to the Minister for Industry and Commerce and severe punishments provided for offences. Apart from public requests, the Commission could be ordered to hold an enquiry by the Minister. The Bill is understood to be causing some disquiet among traders.

Minister Urges New Steel Scrap Drive

AN appeal to save as much steel scrap as possible has been made by the Minister of Supply, Mr. D. Sandys, to some 13,000 steel consuming firms. In a personal letter to managing directors, the Minister states that industry is at present being severely handicapped by the acute shortage of steel. Steel-makers are, he said, short of one of their basic materials—scrap. The situation has developed following the reduction of imports of scrap from Germany, and there was little prospect of increasing imports, the Minister has stated.

The campaign last year produced over 300,000 tons of additional scrap, collected within steel works, and this year deliveries of scrap to steel works from outside sources have been increased by over 3,000 tons per week.

A recent photograph of progress which is being made in the erection of the engineering headquarters of the B.E.A. in London. It will eventually house the Authority's engineering and accounts departments. Incidentally, the picture was taken from the top of the 300-ft. chimney of the new Bankside power station

MR. STEWARD EXPLAINS VIEWS ON FUEL POLICY

FOLLOWING his remarks on the proposed national fuel policy, earlier last month (see our June 12 issue), Mr. S. F. Steward further explained his and the S. Western Electricity Board's views when he addressed the Area's Consultative Council last week. He said he believed in stimulating competition for the housewife's favour, she was the nation's best economist. The best way to determine a domestic fuel policy was to ensure that prices were a reflection of the true costs of using the nation's fuel resources—then it could be safely left to the housewife to choose the most economic, convenient and cleanest of fuels.

Referring particularly to the South West, Mr. Steward said development was only possible by securing adequate return on the capital expended annually in providing electricity supplies. If further progress was to be made towards taking electricity to the 50,000 rural premises still unconnected in the Area, consumers had to be free to take full advantage of the supply available. Half the energy sold in the S.W., Mr. Steward continued, was used by domestic consumers, and if, as had been suggested, the domestic heating and cooking load was arbitrarily reduced, the fall in revenue would have serious consequences to the Board, and to consumers of all classes.

He concluded by saying a national fuel policy should be related to the need for greater industrial and food production, efficient use of capital assets and the need for an improved standard of hygiene.

Mr. Steward broadcast on activities of the Board in rural affairs last Friday.

BATTI-WALLAHS TOLD OF OLYMPIC PROSPECTS

THE principal guest at the Batti-Wallahs Luncheon last Wednesday was Harold Abrahams, who chose as his subject our Olympic prospects. He thought the team going to Helsinki this year was the best that had ever been selected, but he warned that medals would not drop into our hands. The increase in speed of running events over the past 25 years had been remarkable. On the whole, he thought that we would at least acquit ourselves creditably and, possibly pick up some medals and titles.

OFFICIAL PUBLICATIONS

HYDRO-ELECTRIC DEVELOPMENT (SCOTLAND). *Constructional Scheme No. 67—Fort Augustus to Glen Truim transmission lines. Explanatory memo.* H.M.S.O.2d. (See Page 38)

STATEMENT OF GUARANTEE *given by Treasury on June 16 on loans raised by B.E.A.* H.M.S.O. 2d.

MONOPOLIES COMMISSION REPORT on wires and cables. H.M.S.O. 5s. (See page 11)

Programme of A.P.L.E. Conference

PRELIMINARY programme of the Association of Public Lighting Engineers' annual conference, which is to take place at Harrogate between September 16 and 19, has just been announced. Briefly it is as follows: Firstly as regards the papers (six in all), one by Mr. N. Axford on "Methods of Controlling Street Lighting" will be read on the Tuesday afternoon; two, comprising "Illuminations and Decorative Lighting" by Mr. H. Carpenter, and "Street Lighting —U.S.A.," by Dr. A. F. Dickerson, on Wednesday; one on "Street Lighting—A Wise Compromise," by Mr. N. Hudson, on Thursday morning; and finally Mr. D. F. Orchard's "Design, Manufacture and Erection of Concrete Lighting Columns," on Friday morning.

The official opening of the conference will be at 11.15 a.m. on the Tuesday following the annual meeting and induction of president. Annual luncheon will be on Thursday, and evening social activities comprise civic reception by the Mayor on Tuesday, and reception by the President on Thursday. There will also be exhibitions of street lighting apparatus and of lamp columns, traffic signs, etc.

B.E.A. Wins £17,520 Dispute Over Hove's Vesting Day Surplus

THE claim by Hove Corporation that they were entitled to retain the £17,520 surplus of the corporation electricity undertaking at vesting day was rejected in the Court of Appeal last week. The Corporation maintained that the money went into the rate fund and lost its identity. The action was between the Corporation and the Ministry of Housing and Local Government and the British Electricity Authority. The matter was first before a Queen's Bench Divisional Court in February when the Corporation was refused leave to apply for orders of certiorari and mandamus against the Ministry, who decided that the £17,520 was held by the Corporation in their capacity as electricity undertakers and not as a local authority. Giving judgment in the appeal Lord Justice Singleton said it was clear that the local authorities could not do what they liked with any net surplus. The amount which could be applied for the purpose of local rate reduction must not exceed 1½% of the outstanding debt of the undertaking. Hove Corporation, having taken all they could, still had a balance in hand as electricity undertakers which could not be used to aid local rates. He accordingly dismissed the applications for orders of certiorari and mandamus, with costs.

WAGE CLAIM FOR ARBITRATION

THE union's claim for an increase of 3d. an hour for manual workers in the electricity supply industry was the subject of a further meeting of the National Joint Industrial Council last Thursday. The unions answered some of the specific points made by the British Electricity Authority at a previous meeting, and it was eventually decided to refer the matter to the Industrial Court for arbitration.

Electronics Course at Harwell

A SPECIALISED course on the design, use and maintenance of electronic instruments used in nuclear physics, radio chemistry and in the work with radio-isotopes is being arranged by the Atomic Energy Research Establishment at Harwell. It will be held at the Isotope School during the week beginning July 14, and applications are invited from physicists and electronic engineers holding a degree, or equivalent qualification.

Briefly, the course will include lectures and practical work concerned with counters, d.c. and pulse amplifiers, coincidence units, scalers and ratemeters. Lecturers will be specialists from the Research Establishment. Fee for the course is 12 guineas and accommodation, etc., will be provided at a charge of 7 guineas. Application forms may be obtained from the Electronics Division, A.E.R.E., Harwell.

New Cookery Book for Electricity

AT a party given by E.D.A. at the I.E.E. last week members of the Press were afforded a preview of some of the E.D.A. exhibits at the Food Fair which opens at Olympia on July 5.

In the Food Fair will be displayed examples of all makes of electric cookers from breakfast models to family sizes. A section of the stand will be equipped as a modern snack bar.

The new "Electricity Cookery Book" by Ester Purvis made its debut at the same time. This spiral backed book opens flat for ease in reading. Its cover is in attractive blue and daffodil and the subject matter easily legible, and well illustrated. Packed with other interesting and useful information such as measures, a table of appropriate sauces, cookery glossary and instructions for carving meat and poultry, this book will be invaluable to the young housewife and we think helpful to the experienced cook, too.

The Electricity marquee at the recent Farm Produce Show at Reading. It was sponsored by E.D.A. in co-operation with the Southern Board

Consumers Want 24-hour Repair Service

CONSUMERS at Dereham, near Norwich, are asking for a 24-hour service to repair installations. It has been requested that a local electrician be put on the telephone so that consumers in trouble could call him out quickly instead of calling on an electrician from Norwich. An official of the Board explained that such an arrangement could be made but consumers would have to pay special trade union rates which would possibly amount to more than the cost of sending a man on normal shift work from Norwich. Union rules did not allow a man to be paid only for the time he was on the job, however short the time was they were obliged to pay for 3 hours time. The only way to have a 24-hour repair service was to establish a shift system, and work at Dereham would not justify that.

E.I.B.A GOLF FINALS IN OCTOBER

THE finals of the annual Electrical Industries National Golf Championship in aid of E.I.B.A. have been arranged to take place at Worthing Golf Club on October 13 and 14. National finalists are selected from the thirteen Area Finals, and qualifying cards may be obtained from appropriate local secretaries. On the first day there will be the National Final for the Sir Montague Hughman Trophy, the Veterans' Cup, and the Foursomes Competition. The Visitors' Trophy Competition will be held on Tuesday.

270 Apprentices in Ten Years

PROGRESS of South Wales Switchgear Ltd., reported in our issue of January 17 last on the occasion of the company's tenth anniversary, has not been confined to records in production, but a substantial contribution to the nation's need for more engineers has also been made. We have just received from the company a small brochure which lists the names of some 270 apprentices who have been trained or are being trained by the company. They include trade apprentices, engineering apprentices, university post-graduate apprentices and trainees from the B.E.A., as well as students from abroad. Since the firm started ten years ago, the number of employees has increased from 30 to about 800, and the apprenticeship scheme has grown proportionately throughout the decade.

RADIO TRAINING SCHEME

A SCHEME of training for radio technical and laboratory assistants is being introduced by the Radio Industry Council in agreement with the Ministry of Labour and National Service. Trainees will register with the Council at the age of 16 or 17 and on completion of some five years' training will be issued with a nationally-recognised certificate. The scheme may warrant deferment of military service.

An Australian Order

AN order for diesel engines and electrical equipment has been placed by the Australian Dept. of Works and Housing with the Brush Aboe Group's Australian Company, British Oil Engines (Australasia) Pty. Ltd. The engines will be coupled to alternators—giving an output of 780 kW—which will be supplied by the Brush Electrical Engineering Co. Ltd. of Loughborough, together with switchgear and other accessories. The whole order is said to be valued at £A500,000.

NEWS IN BRIEF

As from Monday, the price per ton below which exports of general manufactures of aluminium is restricted has been increased from £180 to £220. This was announced last week by the Board of Trade.

New physics and engineering laboratories have been opened at King's College, London.

Southampton Technical College was officially opened last Friday.

The President of the Board of Trade has appointed five new members of the Council of Industrial Design. Among seven members reappointed on the termination of their existing appointments was Sir Leslie Gamage.

The Extraordinary and Annual General Meeting of E.I.B.A. is to be held on July 17 at 11 a.m. at the I.E.E., Savoy Place, W.C.2.

The annual report of the Aluminium Development Association for 1951 has just been published. Among its pages is to be found a brief review of recently undertaken work in connection with mining equipment and electrical engineering.

Dr. R. L. Hearn, chief engineer of the St. Lawrence Seaway Board with its three million h.p. projected development with Dr. W. M. Hogg past chairman of the H. E. Power Commission of Ontario and Mr. S. Chaplin of Enfield Cables Ltd., at a demonstration of 220 kV splicing at the Canadian Internation Trade Fair in Toronto, staged by Enfield Cables

In the latter field existing interest on aluminium for conductors and components has been maintained while other applications are being explored.

Questions in Parliament . . .

Utilisation of Fuel Resources

Replying to questions on steps being taken to utilise more effectively the country's coal resources, Mr. G. Lloyd told the House on Monday that the Ministry's Scientific Branch was conducting research into new uses of fuel, new methods of generation and transmission, and the use of marginal or hitherto untapped sources of energy. Scientific developments in the whole field were also being studied. A staff of 170 engineers and technicians were constantly advising industrial and other concerns, he added.

Mr. Lloyd said the B.E.A. and N.C.B. were experimenting with pithead generation to utilise hitherto unusable coal, and the super grid would facilitate the generation at coalfields of a much larger proportion of electricity than was at present consumed in the S.E. It was the Government's and the B.E.A.'s policy, he continued, to develop joint steam and electricity production where practicable. No satisfactory way had yet been found as efficient as the large power station.

Building Gloucester Service Centre

Mr. G. Lloyd answered questions on the Midland Board's building project at Gloucester's service centre. He said £15,000 of work had been authorised in August 1949. Work was completed last October at total cost of just over £17,143, the excess being due to increased cost of materials and difficulties with foundations. The facts were being examined.

Post Office Staff Union Dispute

Mr. David Gammans told the House last week that it had been decided not to impose the recommendations contained in the report of the Post Office (Departmental Classes) Recognition Committee, set up under the chairmanship of Lord Terrington. The report recommended a reduction in the number of unions representing employees. The Government, he said, was most reluctant to become involved in questions on how unions should be organised and it was thought the dispute should be settled by the staff themselves and not by the Ministers' decision. Consequently

a further effort should be made by the unions to reach a settlement and consideration would be suspended until early in 1953 in order to give the parties concerned every opportunity to settle their differences. It was, however, proposed to recognise the Telephone Sales Supervising Officers' Association which claimed a membership of over 90%.

N. Wales H.-E. Bill

The N. Wales Hydro-Electric Power Bill has been read a third time and passed.

Royal Assent

Mr. Speaker reported to the House on Thursday that the Royal Assent had been given to the Electricity Supply Meters Act, 1952.

Stocks of Sulphur and Metals

The Secretary for Overseas Trade gave figures indicating the variations in stocks of sulphur and non-ferrous metals since November 1, 1951.

	Thousand Tons	
	Nov. 1, 1951	May 1, 1952
Sulphur	116	110
Copper	124	113
Lead	47	116
Zinc	36	65

He added that commercial stocks of raw materials generally should be adequate to support expected levels of consumption.

Disposal of Uncollected Goods

Certain amendments were introduced to the Bill under the above name on Friday. A new clause has been included dealing with cases where goods have been accepted for repair before the Act comes into force and where the trader is unaware then of the customer's address. Other amendments introduced related to the adequacy of advertisement before the goods are sold, and to reasonable charges for storage. The amended Bill was accordingly read a third time and passed.

The Fireguards Bill

The Heating Appliances (Fireguards) Bill, as amended in the Standing Committee, was read a third time on Friday and passed.

Shortage of Pipes

Following our report concerning the shortage of gas pipes in Sunderland on page 1185 of last week's issue, we note that the Minister of Housing has been asked to what extent the housing programme was being retarded by a shortage of steel pipes and cement. The Minister said there was a shortage in some areas but everything possible was being done to overcome the problem. Pressing the matter of steel pipes Mr. Ewart said this was affecting the housing programme inasmuch as gas services were provided in only a certain number of houses, while in others tenants were deprived of the amenities desired. In other words they were being offered a choice of gas or electricity and that was due to the shortage of pipes. The Minister replied that if steel mains were referred to, there was a shortage and long delivery dates, but if steel conduit pipes were meant by the words "steel pipes" there were many substitutes. As regards Sunderland in particular, the Minister said the shortage of cast-iron gas pipes was being considered. Although some delay in providing gas supplies was inevitable, there would be no interference with the completion of houses.

Building Licence Limit

Replying to questions on the licence-free allowance for building work, Mr. David Eccles said last week that an order was being made, continuing for 12 months from July 1 the present limit of £500 for industrial and agricultural buildings, but increasing the limit for other buildings to £200. The position will be reviewed in the autumn.

District Heating

Requests for a Government investigation into the technical and economic features of district heating were made last week by Sir Herbert Williams. He was speaking, for procedural reasons, on the Essex County Council Bill, which includes provisions for a scheme at Dagenham, and he suggested that in several schemes which had been started, the eventual cost had greatly exceeded original estimates. At Urmston (Manchester) the charge per house was 10s./week; for the Pimlico scheme 9s. 5d. for a four-room flat; at Salisbury, 10s./week. It was necessary to know if the schemes were being really successful and he asked for a proper enquiry, carried out jointly by the Ministries of Housing and Local Government, and of Fuel and Power.

Mr. F. J. Errol, seconding the amendment being considered, suggested that the Pimlico scheme was achieving a moderate success, but that it was a very special case. The fact that the transmission pipes were buried under the river was especially favourable.

Mr. J. Parker mentioned the need to educate tenants in the ways to use district heating, and spoke of troubles with copper pipes which fractured. At Dagenham heating was used both for space heating and for hot water heating; he thought the scheme had many advantages. Provision had been made for electricity to be available for heating in the summer months.

Mr. Winterbottom said that the economy of the Pimlico scheme could only be estimated when the full number of flats concerned were being supplied. He supported the request for an enquiry. Mr. E. Shackleton mentioned a scheme planned for Preston which would provide district heating for industrial purposes.

Replying to the debate, Mr. Marples (Parliamentary Secretary, Ministry of Housing and Local Government), described how the Simon Report on district heating (1946) had advised the setting-up of an inter-departmental committee on central heating with a sub-committee on district heating. Twelve district heating schemes were to be started in the country (a 1948 decision). So far, 11 schemes had got under way. The sub-committee had not yet submitted a report on a scheme; but they had in final draft a memorandum on experience gained so far. He could not undertake that this report would be laid before Parliament.

Electric Supply News . . .

Aberdeenshire

The North of Scotland Hydro-Electric Board is to make a start with a restricted scheme which will supply electricity to consumers between the Brig o' Feugh and Strachan, it was disclosed at a meeting of Aberdeenshire General Purposes Committee.

The Board has also considered the possibility of extending distribution from Strachan to Finsean, but as the cost would be high—approximately £27,300 for 68 consumers, it has been decided to shelve that scheme for the present.

Cowes

Contending that the outlet from the B.E.A.'s power station is making the water of the Medina Estuary too hot, and detrimental to fish, Cowes Harbour Commissioners are taking up the matter with the Southern Sea Fisheries Board.

Durham

The County Planning Authority has approved the following proposals by the North-Eastern Electricity Board: Erection of 11 kV line between Darlington and Dinsdale in connection with the h.v. reinforcement of Dinsdale area; erection of 20 kV line and pole-mounted substation, l.v. overhead line and reinforcement of Ferryhill network; erection of l.v. o.h. line and reconstruction of existing lines at Great Usworth; erection of 20 kV line at Tudhoe; l.v. o.h. line and reconstruction of network at Littleburn, Langley Moor, New Seaham, East Kyo, Crookgate, and New Kyo. Proposals submitted by the B.E.A. and also approved included a 132 kV switching substation forming part of the Stella South power station; erection of 132 kV inter-connectors there and of 132 kV lines Stella to Norton and Stella to Dunston.

Eire

Representatives of 20 local authorities in Eire at a meeting with officials of the Electricity Supply Board in Limerick, last week, urged that charges for electricity should be standardised throughout the country. Chairman of the Board Mr. R. F. Browne, said the E.S.B. was investigating ways and means of bringing in a new system of charges which would not have a fixed charge related to poor law valuation and would lead to a further levelling out in electricity rates, but he could not say that this would lead to the same domestic charges in Limerick and other areas as in Dublin and he could not give a date for the change.

Glendale, Northumberland

The Rural Council has been informed that the South East Scotland Electricity Board is to spend £10,000 during the next few months supplying electricity to the rural area. Recently strong representations for an electricity supply have been made by the local authority, supported by the National Farmers' Union and others.

Isle of Man

In Tynwald recently, the £30,000 vote for the Isle of Man Electricity Board, to enable supplies to be given to farms, was approved.

N. of Scotland

The North of Scotland Hydro Electric Board's scheme for an addition to the 132 kV Highland grid to be erected over the 2,507-ft high Corrieyairick Pass in Inverness-shire, has been confirmed by the Secretary of State for Scotland. This new line will stretch 25 miles from a transforming station to be erected at Fort Augustus to a point in Glen Truim on the existing main transmission lines between Tummel and Keith in Banffshire. The new line will transmit power produced by the Garry and Moriston generating stations. Cost of the project is estimated at £450,000. In response to recommendations the Board has agreed to adjust the proposed route of the line where it passes through the Corrieyairack Pass so as to keep the line further away from General Wade's famous road which was built over 200 years ago.

Port Talbot

Electricity supplies should be laid on to most parts of Cwmavon, Baglan and Margam by March 31, 1953, Port Talbot T.C. was told last week by the South Wales Electricity Board.

LIGHTING SCHEMES

Aberdeen.—The Lord Provost's committee has recommended that necessary equipment should be purchased and arrangements made for floodlighting a number of buildings in the city.

Chester.—T.C. recommended to approve a scheme for the lighting of Liverpool Road, with 42 500 W tungsten lamps, at a cost of £2,745.

Chesterfield.—T.C. has scheduled for a further area for conversion from gas street lighting to electricity; 331 electric lamps will replace 230 gas lamps. M.o.T. approval has been received to extend grade A lighting in certain streets, at a cost of £3,476.

Jarrow.—T.C. is considering conversion of street lighting from gas to electricity. Estimated cost £10,000.

Knaresborough.—A proposal to light Harrogate Road to the Knaresborough boundary, at a cost of £1,789, is awaiting M.o.T. approval.

Leamington Spa.—T.C. proposes to spend £2,500 on the installation of fluorescent lighting in Kenilworth Road.

Newcastle-on-Tyne.—T.C. to spend £5,975 on the erection of 45 street lamps at Montagu housing estate and 194 on the Slatyford estate.

Portmadoc.—The U.D.C. is considering the question of conversion of street lighting from gas to electricity.

Company Activities . . .

Campbell and Isherwood

The net profit for 1951 is £14,944 (*£22,062*) after charging taxation of £29,284 (*£34,606*). The dividend is 10% (*20%*), and £5,000 (*£10,000*) is transferred to general reserve.

E. K. Cole Ltd.

Group net profit for the year to March 31 last is £159,215 (*£155,050*) after charging depreciation, taxation, etc. The final Ordinary dividend is 15%, again making 25% for the year, but on capital enlarged by 25% in September 1951.

Crompton Parkinson

Having obtained the necessary consents for the consolidation of the Ordinary and "A" Ordinary stocks and the payment of compensation to existing Ordinary stockholders, the directors have allotted 75,000 Ordinary shares of 5s. each (converted into Ordinary stock on allotment) to the persons registered as the holders of the issued 600,000 Ordinary stock units in the proportion of one additional stock unit of 5s. for every eight stock units held.

Thomas De La Rue Co.

Group profit is £659,842 (*£545,846*). U.K. taxation absorbs £406,059 (*£359,070*), and the profit attributable to the holding company is £253,651 (*£163,654*). The final Ordinary dividend is 15%, making 20% (*50%*) on enlarged capital.

Electrical Switchgear and Associated Manufacturers

For the year to March 31 last, the consolidated net profit, after depreciation, and U.K. tax of £165,615 (*£95,021*), is £106,771 (*£76,661*). The Ordinary dividend absorbs £103,752 (*£121,117*), and there is £20,000 (*same*) carried forward.

Hick, Hargreaves & Co.

Profit for the year to March 31 last is £143,789 (*£140,050*) after all charges, including taxation of £162,007 (*£144,819*). The final dividend is 15% making 20%.

Marryat and Scott Holdings Ltd.

After charging taxation of £72,000 the net profit for the year to March 31 last is £37,088. The dividend is 22½%, which is at the same rate as was paid for the period October 12, 1950, to March 31, 1951. The balance of £26,150 (*£7,524*) is carried forward.

Reliance-Clifton Cables and Industrial Products

Consolidated trading profit, etc., for the year to November 30 last is £271,185 (*£228,962*). After charging depreciation of £15,576 (*£10,017*) taxation £138,596 (*£110,519*) etc. the consolidated net profit attributable to the group is £103,794 (*£93,814*). To this is added profits of previous years £26,720 (*nil*). The final Ordinary dividend is 17½% (*20%*) making 30% (*same*). Allocations to reserves absorb £101,250 (*£63,296*) and there is £31,830 (*£29,765*) carried forward.

Scophony-Baird Ltd.

A trading profit of £35,457 for the year to March 31 last, is shown in the preliminary statement. The previous year resulted in a loss of £55,883 But there is again no dividend. The net profit amounts to £6,779 (*loss of £142,864*) after writing off expenditure on development account and patents, etc., and placing £10,000 (*nil*) to general reserve.

Scottish Cables Ltd.

For the year ended April 30 last, the trading profit is £311,278 compared with £274,561 for the previous period. To this is added investment income of £15,920 (*nil*). To U.K. and overseas taxation £178,795 (*£143,700*), depreciation and audit fee £23,503 (*£24,656*) leaving a balance of £124,900 (*£106,205*). The final Ordinary dividend is 22% (*20%*) making 32% (*30%*) on increased capital. Share issue expenses absorb £7,904 (*£4,873*), to general reserve £60,000 (*£45,000*), and £26,515 (*£25,606*) is carried forward. The directors state that subject to the consent of the Capital Issues Committee, it is proposed to recommend a one-for-one scrip bonus.

Telephone Manufacturing Co.

For 1951 the group profit is £286,474 as against £299,273 for the preceding period. After directors' emoluments, repairs and depreciation there is a balance of £216,242 (*£237,915*) before taxation, to which is added £69,734 (*nil*) adjustment on revision of prices on earlier contracts. Taxation absorbs £174,571 (*£128,998*), and the net profit attributable to T.M.C. is £80,321 (*£86,413*). Dividends have already been noted; and there is £75,000 (*£25,000*) to general reserve.

John Thompson

The directors are offering 687,959 Ordinary 5s. shares at 14s. 6d. each to Ordinary stockholders on the basis of one-for-four. They will be entitled to the final dividend for 1951.

Dividends Declared

Hoover Ltd.—Interim of 10% (*same*) but on larger capital.

Telegraph Construction and Maintenance Co.—Interim of 5% (*same*).

Telephone Properties. Dividend is again 8%. Net profit after all charges, including tax, is £48,919 (*£57,018*).

Electric Construction Co.—Dividend of 15% (*same*).

J. and E. Hall.—Interim of 2½% (*same*).

S. Smith and Sons (England).—Interim of 2½% (*same*).

Commercial Information

CONTRACTS OPEN

HOME

July 4.—Lancashire. Electrical installation at fire brigade headquarters, Broughton. Applications to County Architect, County Hall, Preston, by above date. Deposit £2.

July 5.—Chislehurst and Sidcup U.D.C. Provision and erection of 27 concrete columns and lanterns with auxiliary equipment for London-Maidstone Rd. Engineer and Surveyor, W. B. Farrow, Council Offices, Main Rd., Sidcup. Deposit £2 2s.

July 7.—Ashbourne U.D.C. Supply and erection of 28 140 W sodium lamps, and 70 150 W tungsten all complete with standards for street lighting. Engineer and Surveyor, King Edward St. Deposit £1 1s. (See June 5 issue.)

July 7.—Dublin. Electrical installation at Dublin Regional Sanatorium, Blanchardstown. P. D. Cinneide, Dept. of Health, Custom House. Deposit £20.

July 7.—Leeds. Supply, erection and maintenance of an electrically driven centrifugal pump with capacity of 1,400 galls. p.m. General Manager and Engineer, Waterworks Dept., Civic Hall.

July 7.—Galway (Eire). Complete electrical installation at Country Clinic, Shantalla. J. A. Kenney and Partners, Consulting Engineers, 44 Kildare St., Dublin.

July 7.—Hull. Electrical installation in completion of Sutton Rd. Temporary School. City Architect, Guildhall. Deposit £1 1s.

July 7.—Nuneaton T.C. Electrical installation at Stockingford county school. Borough Surveyor, Council House. Deposit 10s. 6d.

July 8.—Horsham (Sussex) R.D.C. Provision of electrical services in certain pre-war houses. Surveyor, Comewell House, North Street.

July 8.—Oldbury T.C. Provision and erection of 59 concrete columns with lanterns fitted with glass refractors and Perspex bowls and 100 W filament lamps and time switches. Borough Surveyor, Municipal Bank Chambers. Deposit £2 2s.

July 9.—Sale T.C. Wiring for lighting and power in 32 houses being built on Oaklea Farm estate. Borough Engineer, Town Hall. Deposit £2 2s.

July 10.—Aberdeen. Electrical work in alterations and additions to Ellon Academy. E. L. Willian son, Architect, 14 Golden Sq., Aberdeen.

July 10.—Clutton R.D.C. Electrical installation in 62 houses on three sites. Architects are Thomas and Morgan and Partners, 23 Celliwasted Rd., Pontypridd. Deposit £1 1s.

July 10.—Darlington T.C. Supply of laboratory and workshop equipment, including electrical and scientific instruments, electric motors and small tools, for Technical College. Chief Education Officer, North Lodge.

July 11.—Bedlington (Northumberland) U.D.C. Supply of electric fittings and cable for council housing schemes. Surveyor, Council Offices.

July 11.—Colne Valley (Yorks) U.D.C. Supply and erection of seven mercury lamps and 25 ft columns at Town-End, Golcar. Engineer and Surveyor, Municipal Offices, Carr Lane, Slaithwaite, nr. Huddersfield.

July 11.—Durham. Electrical installation at School of Agriculture, Rural Domestic Economy Centre, Houghall. Applications by above date to G. R. Clayton, County Architect, Court Lane.

July 11.—Sheffield. Electrical installation in 414 dwellings on Hackenthorpe estate. W. Geo. Davies, City Architect, Town Hall. Deposit £1.

July 12.—Prescot U.D.C. Supply, erection and commissioning of sodium vapour discharge lighting units on Liverpool-Warrington trunk road, A.57. Distance is about 2,886 yds. Council Offices. Deposit £2 2s. (See June 26 issue.)

July 14.—Selkirk T.C. Supply erection of mercury street lighting along about 1,135 yd. of Edinburgh-Carlisle trunk road within burgh, to Group "A" standard, comprising 31 units. W. Y. Carmichael, Town Clerk, Municipal Buildings.

July 16.—Gloucester. Supply and installation of two electrically driven well pumps at Newent station. Pumps to be driven by shafts from vertical motors on surface. J. H. Goodridge, City Surveyor and Water Engineer, 21 Eastgate St. Deposit £2 2s. (See May 29 issue.)

July 18—Londonderry. Complete electrical installation at Garvagh Intermediate school. J. R. W. Murland, Consulting Engineer, 13 Wellington Place, Belfast. Deposit £3 3s.

July 18.—Londonderry. Electrical installation at Portstewart primary school extension. F. W. Parkinson and Partners, Consulting Engineers, 6 Murray St., Belfast. Deposit £3 3s.

July 19.—Manchester. Electrical installation to main hall and outbuildings, Superintendent's House, and drive lighting at Oakwood Hall, Romiley. City Architect. Town Hall. Deposit £1 1s. (See June 19 issue.)

July 21.—Sunbury-on-Thames U.D.C. Wiring and equipping for lighting by electricity in 92 houses at Green Lane, Green Leas and Cavendish Rd. Engineer and Surveyor, Council Offices.

July 28.—Hastings T.C. Electrical installation at Tivoli primary school. Borough Engineer, 37 Wellington Sq. Deposit £2 2s. (Advertised in this issue.)

July 28.—N. Ireland. Electrical installation in 126 dwellings at Rathcoole for N.I. Housing Trust. Trust offices are at 12 Hope St., Belfast.

July 31.—Cheshire. Names of contractors for electrical installation work required by County Council for list of contractors and suppliers. Application forms should be returned to E. Mainwaring Parkes, County Architect, The Castle, Chester, by above date.

Aug. 1.—Belfast. Supply and erection of (*a*) three-phase l.v. high rupturing capacity switchgear, and (*b*) carbon dioxide fire extinguishing equipments for substations. Electricity Dept., E. Bridge St. Deposit £2 2s., (See June 19 issue.)

Aug. 7.—Strabane R.D.C. Supply of one electrically driven

sludge pump and other equipment for Sion Mills sewerage scheme. Consulting Engineers, Croasdaile and Taggart, 36-38 Castle Arcade Bldgs, Belfast.

No date stated.—Coatbridge T.C. Electrical work in erection of houses in Kirkwood and Kirkshaws area. Apply to A. S. Thom, Town Clerk, Municipal Buildings.

OVERSEAS

*Details of items marked * may be obtained on application to the Board of Trade, Horseguards Avenue, S.W.1, quoting reference.*

July 21.—India. Directorate General of Supplies and Disposals, Shahjahan Rd., Delhi, invites tenders for supply and erection of two 100 kW a.c. generating sets, fully automatic with inter-connecting cables and accessories. B.o.T. (Ref. CRE 22166/52)*.

July 21.—South Africa. Supply and erection of H.E. generating set with control panel—wiring included—for Badplaats. Viljoen and Keyter, Southern Life Building, Cor. Main and Harrison Sts., Johannesburg. B.o.T. (Ref. CRE 22436/52)*

July 22.—Uruguay. Supply of two 220 V (3-phase) motor-driven electric soldering units, fully enclosed and mounted on wheels, for Ferrocarril Central del Uruguay. B.o.T. (Ref. CRE 21746/52)*.

July 24.—Canada. Supply of a.c. switchboards for passenger stations and Darisville shops of Toronto Transportation Commission, Yonge St., subway project. Commission is at 35 Yonge St., Toronto. B.o.T. (Ref. CRE 22508/52)*.

July 28.—Uruguay. Ministerio de Salud Publica requires supply of miscellaneous electrical equipment including several thousand insulators, over 10,000 metres of wire, fuse boxes, piping, lead telephone cable, heater plugs, radiators, Bergman clamps, resistances, electric lamps, sun lamps, switches, irons, portable lamps, starters, fluorescent tubes and fittings, B.o.T. (Ref. CRE 21674/52)*

Aug. 5.—South Africa. Supply and erection of 11 kV and lower voltage transformers for Bloemfontein council's new power station. Tender form No. L.1248 obtainable from consulting engineers, Merz and McLellan (S.Africa), 1419 Escom House, Rissik St., Johannesburg. Deposit £2 2s.

Aug. 12.—Australia. Supply of diesel alternator sets to various specifications required by Director, Posts and Telegraphs, Melbourne. Documents from Chief Supply Officer's Dept., Room 406, Australia House, Strand, W.C.2, quoting Schedule C.6783.

Sept. 3.—Australia. Manufacture, supply and erection of two banks (13 and 14) of l.t. switchgear for Howard power station. State Electricity Commission of Queensland, Scottish Union House, Eagle St., Brisbane. B.o.T. (Ref. CRE 21990/52).*

Sept. 11.—South Africa. Stores Dept. of S. African Railways require supply of a number of 4-ton electrically driven portal jib cranes (tenders C4505 and C4544), and for 15-ton electrically driven portal jib cranes. Details from Chief Stores Superintendent, Room 202, Park Chambers, Rissik St., Johannesburg, or offices of S.Africa Stores Superintendent, S.Africa House, London.

Oct.—New Zealand. State H.E. Dept. invites tenders for supply of five sets of equipment as follows: (i) 100 MVA 11 kV switchgear of single busbar, metal-clad, indoor drawout type for Arapuni power station, closing date Oct. 7; (ii) 150 MVA 11 kV switchgear of duplicate busbar indoor, metal-clad drawout type for Thames substation, closing date Oct. 14; (iii) 250 MVA 11 kV switchgear of duplicate busbar indoor, metal-clad, drawout type for Huntley 110 kV substation, closing date Oct. 21; (iv) 10,000 kVA 110/33 kV transformer bank and spare unit for Palmerston substation closing date, Oct. 14; (v) same as (iv) for Milton substation, closing date Oct. 21. Plans can be seen at N.Z. Govt. Offices in London.

CONTRACTS PLACED

B.E.A. One 60,000 kW turbo-generator, condensing and feed heating plants, transformers, etc., at Brunswick Wharf, Metropolitan-Vickers Co., Ltd.; 6,600 volt switchgear, at Hackney, G.E.C., Ltd.; one 30,000 kW turbo-generator, G.E.C., Ltd., and condensing and feed-heating plant for above set, at Woolwich, Worthington-Simpson, Ltd.; two 60,000 kW turbo-generators at Marchwood, British Thomson-Houston Co., Ltd.; two 180,000 lb/hr boilers at E. Yelland, John Thompson Water Tube Boilers Ltd.; two 300,000 lb/hr boilers, Clarke Chapman and Co., Ltd.; two 30,000 kW turbo-generators, British Thomson-Houston Co., Ltd., and condensing and feed-heating plants for above sets at Goldington, G. and J. Weir, Ltd.; three 60,000 kW turbo-generators at Hams Hall C, General Electric Co., Ltd. one 60,000 kW turbo-generator, G.E.C., Ltd. and condensing and feed-heating plant for above

Your Queries — Answered

"Quenchol" fusegear, makers of? S.F.—General Electric Co. Ltd., Magnet House, Kingsway, W.C.2. (23284)

"Speed-Queen" washing machines, address for spares? J.E.—Try: Apex Electrical Eng. Co., 116/118, Camp Rd., Leeds 7; Canadian Electric Washing Machine Co., 45 South End, Croydon. (23289)

"Minwink" toasters, makers of? A.M.—S. T. Meggitt & Co. Ltd., 22/28, Alumhurst Rd., Bournemouth West. (23295)

"J.M.D. and S. London" kettles, makers of? S.E.—J. M. Doughty and Sons Ltd., 214 St. John St., E.C.1. (23306

"Bi-Uni" Switches, suppliers of? G.C.—Scemco Ltd., 61b Soho St., W.1. (23310)

"Meron" infra red equipment, agents for? S.E.—"V" (Development and Trading) Ltd., 22 Clifton St., London W.9. (23318)

"Wylie" crane switches, makers of? E.C.—Wylie Safe Load Indicators Ltd., 50 Pall Mall, S.W.1. (23326)

"Roblec" irons, makers of? S.E.—Robson Electrical Products Ltd., Union St., West Bromwich, Staffs. (23334)

The above are selected from questions we have answered this week. If you have a query, send it to us.

set at Ince, Hick, Hargreaves and Co., Ltd.; two 550,000 lb/hr boilers at Keadby, Stirling Boiler Co.; Coal handling plant at Stella North, Birtley and Co., Ltd.; and two 30,000 kW turbo-generators and generator transformers, G.E.C., Ltd., and main auxiliary and control cables and connections at Huncoat, W. T. Glover and Co., Ltd.

Exeter. Improved street lighting along 6,550 ft of Topsham Rd., General Electric Co., Ltd., £1,454.

Longbenton U.D.C. Electrical installation in 32 houses at Forest Hall and 28 at Wideopen, J. B. Wilson. Same in 128 houses on Burradon estate and 70 on Fordley estate, J. G. Patton.

Newcastle. Provision of sub-station and electrical equipment for coal staiths at Whitehill Point for Tyne Improvement Commission, English Electric Co. Ltd.

Swansea T.C. Electrical work at Clywd primary school, Clarke Bros. (Stroud) Ltd., £4,527.

Wandsworth B.C. Supply of 250 concrete street lighting columns, Concrete Utilities, Ltd., £5,170.

TRADE NOTES

Changes of Address. As from July 7, the London sales office of the Electrical Apparatus Co., Ltd., will be transferred to 199a Victoria Street, S.W.1. Telephone: Tate Gallery 8264.

The Central Publicity Department of I.C.I. has moved to North Block (ground floor) of Thames House, Millbank, S.W.1. Telephone: Victoria 4486.

Tungsten. From June 26, the selling price of tungsten ore of standard 65% grade and ordinary quality, was reduced to 467/6d. per long ton delivered.

Holidays. The Southend works of E. K. Cole Ltd., will close from July 25 until August 11.

Messrs. Keith Blackman Ltd. announce that their Abroath works will be closed from July 18 to August 4, and the Tottenham works from August 8 to August 25.

Aluminium. The price of virgin aluminium in ingot form, of 99-99·5% purity was increased from July 1, by £3 to £157 per ton delivered.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	281 0 0	—
LEAD, good soft pig (foreign)	137 0 0	128 0 0
" "English" quality	138 10 0	
TIN (99-99.76%) (Cash)	968½-969	—
" (3 months)	965-965½	—
ALUMINIUM, commercial purity (del.)	157 0 0	—
ZINC	130 0 0	120 0 0
ARMOURING:		
Galv. Steel Wire (0.104 in.)	55 10 0	—
Mild Steel Tape (0.04 in.)	39 15 0	—

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Carwin Electric Co., Ltd. Meetings of creditors and members will be held at 2 Chapel St., Preston, Lancs, on Aug. 1, at 3 p.m. and 3.30 p.m. resp. to receive liquidator's report.

Voluntary Liquidation

Camden Components Ltd. At statutory meeting of creditors statement of affairs showed liabilities amounting to £7,006 of which £5,869 was due to trade creditors and £1,136 to directors and shareholders. Assets estimated to realise £11,019 and after allowing £145 due to preferential creditors and £6,049 to debenture holders, there were net assets of £4,824 or deficiency as regarded creditors of £2,181. Issued share capital was £6,060 and, so far as the shareholders were concerned, there was total deficiency of £8,241. Resolutions passed confirming voluntary liquidation with R. F. Bendall, C.A., of Poppleton and Appleby, 126, Colmore Row, Birmingham, as liquidator, with committee of inspection.

BANKRUPTCY ACTS

First Meeting

Liverpool. Robert J. F. J. Slinger, electrical engineer trading at 15 Lily Rd., Litherland. Meeting tomorrow (Fri.) at Official Receiver's Office, West Africa House, 25 Water St., Liverpool, at 11 a.m., and public examination at Court House, Fruit Exchange Buildings, Victoria St., Liverpool, on July 29, at 10.30 a.m.

Birmingham. Hugh Brash Campbell, electrical and television engineer trading as "Electronic Trade Services" at 2170 Coventry Rd., and 227a Golden Hillcock Rd., Birmingham, and at 2-4 Little Peter St., Manchester. Meeting at Official Receiver's Office, Somerset House, Temple St., Birmingham, tomorrow (Fri.) at 11.15 a.m., and public examination at Court House, Corporation St., Birmingham, on Sept. 24 at 10.45 a.m. Date of receiving order, June 19.

Release of Trustee

Lincoln. Eric W. Chapman, electrical and radio engineer, trading at London House, King St., Market Rasen. Trustee was R. Taylor, C.A., 150 High St., Scunthorpe.

Intended Dividends

Birmingham. Frank H. Poultney trading as Bordesley Electrical Co., at 164 High St., Bordesley, Birmingham. Last day for receiving proofs, July 10. Trustee is R. K. Clark, Official Receiver, Somerset House, 37 Temple St., Birmingham.

Dividends

Sunderland. John R. Short, electrical contractor trading at 11 Rutland Ave., Bishop Auckland. First and final dividends of 2d. in £, payable on July 10, at Official Receiver's Office, Gibb Chambers, 54 Westgate Rd., Newcastle.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Aldis. 696,376. Class 9. Lenses, enlargers; episcopic and diascopic apparatus, and signalling lamps. Aldis Bros. Ltd., Priory Works, Sarehole Rd., Hall Green, Birmingham 28.

Myria. B706,469. Class 9, Ohmmeters. Electronic Instruments Ltd., 17 Paradise Rd., Richmond, Surrey.

Quickway. B694,461, Class 7. Coil winding; and forming machines. Midland Dynamo Co. Ltd., 64 Belgrave Gate, Leicester.

BUSINESS PROSPECTS

HOME

Bedford. Approval granted to erection of 200 houses in Church Lane for National Aeronautical Research Establishment.

Bentley - with - Arksey (Yorks) U.D.C. Erection of 36 houses. R.N. Penlington, Engineer, Council Offices, Cooke St., Bentley.

Birkenhead T.C. Tenders to be invited for rewiring of premises at "Calthorpe," Vyner Rd., being converted into hostel; work at the town hall involves installation of emergency lighting system costing £375, and of electric power circuit on two floors at cost of £200.

Blackwell (Notts.) R.D.C. It is planned to erect 880 miners' houses by end of 1953 comprising 540 in Shirebrook Common Lane, 190 at South Normanton and 160 in Tibshelf Back Lane.

Brigg U.D.C. Five blocks of flats to be built in district.

Brighton, T.C. Erection of 16 flats on Albion Hill site and block of 8 flats at Park Crescent Terr. Borough Surveyor.

Cavan (Eire). Plans approved for erection of 50 houses.

Chester T.C. Quotations to be invited for re-wiring of electrical installation at Transport Depot.

Cockermouth. N.E. Housing Association, Curzon House, Maryport, is to build flats in Sullart St.

Cookstown (Tyrone) T.C. Tenders to be invited shortly for erection of nine blocks of flats on Shrub End site.

Coventry. Hospital Group is considering plans for new hospital.

Cricklade and Wootton Bassett (Wilts) R.D.C. Erection of 40 houses and bungalows on three sites. J. C. Grindley, Engineer and Surveyor, Council Offices, Wootton Bassett.

Crook (Durham) U.D.C. Erection of 37 houses at Witton-le-Wear. Architects are T. A. Page, Son and Hill, 75 King St., South Shields.

Crosby T.C. Amended plans approved for further 76 houses on Brownmoor Lane estate.

Cumberland. Plans prepared for construction of secondary school at Halfway House, Penrith. County Architect, J. H. Haughan, Portland Sq., Carlisle.

Dewsbury T.C. It has been proposed that 120 houses be built on School Lane site, 30 on Staincliffe Rd. site and 24 on Green Lane No. 2 site.

Dunblane T.C. Modified scheme to be prepared for repair of wiring in temporary houses.

Durham. Flats are to be built in Sunderland Rd. area. City Engineer, W. J. Green, Town Hall.

Easington (Dur.) R.D.C. Electric lighting to be improved in certain council houses. Total cost will be £1,400.

Feltham U.D.C. Erection of 71 dwellings on Viola Farm estate, Engineer and Surveyor, Lynton House, Hanworth Rd.

Halifax T.C. Erection of 102 houses at Mixenden and eight at Illingworth. Borough Engineer, Crossley Street.

Hertford R.D.C. Plans approved for 34 houses at Lower Green, Tewin.

Kelton (Rutland) R.D.C. Further 30 houses proposed to be built in district. Architects are F. J. Lenton and Partners, Broad St., Stamford, Lincs.

Kilmarnock T.C. Re-development proposal approved for erection of 323 flats, shops, nursery school etc. on Robertson Place site, and 1,859 houses and flats and a number of shops on Bellfield estate.

Leicester. Approval given to building of 298 flats, houses and bungalows on Eyres Monsell estate. City Architect.

Lowestoft T.C. It is proposed to build 72 houses on Whitton estate.

Mansfield T.C. Erection of 58 houses on Debdale Lane estate. Borough Engineer and Surveyor, Carr Bank.

Morpeth R.D.C. Construction of 40 houses on Hadstone site, Surveyor is at Dacre St.

Newcastle-on-Tyne. Building programme for next year includes Rutherford grammar and high schools, Fossway secondary school, and Stocksfield Ave. primary school. Work on Rutherford College of Technology is not expected to be ready for tender until December.

Oakengates U.D.C. Erection of 44 houses on Furnace Lane site, Trench, and 26 on Grove estate, St. Georges. Engineer and Surveyor, Council Offices, Stafford Road.

Poole T.C. Erection of 170 houses in six contracts ranging from 16 to 36 houses on Waterloo estate. Borough Engineer, Municipal Buildings.

Ramsbottom T.C. Layout approved for erection of 83 houses at Tag Wood.

Rugby (Warks.) R.D.C. 87 houses to be built at Wolston.

Runcorn U.D.C. Approval given to erection of further 71 houses on Lamstickle Lane estate. Estimated cost £101,490.

Staffordshire. Upper House, Barlaston, is to be adapted as home for blind at estimated cost of £21,900.

Stretford T.C. Erection of block of 24 flats on Thomas St. site. A. H. Perry, Borough Surveyor, Town Hall.

Williton (Som) R.D.C. Thirty-two houses to be built this year at Carhampton, 8 at Stogumber, 12 at Washford, 6 at Holford and 2 at Selworthy.

Whitehead (Antrim). N. Ireland Housing Trust to build 40 to 50 houses in district.

Whittlesey U.D.C. Permission received to undertake or authorise erection of further 80 houses. Ruddle and Wilkinson, Longcauseway Chambers, Peterborough.

OVERSEAS

Greece. Agesilas E. Pangalos, 43 Sokratous St., Athens, wish to represent U.K. manufacturers of washing machines, refrigerators, floor polishers, vacuum cleaners and other electric domestic appliances. Interested firms should communicate direct.

U.S.A. Western Regional Sales, 106 S.E. Hawthorne Boulevard. Portland 14, Oregon, would like to receive proposals from U.K. manufacturers of all types of mechanical handling equipment, including conveyors, hoists, stackers, fork lift trucks and loaders and shovels.

Canada. A company in Montreal is interested in obtaining a source of supply for small fractional h.p. motors, both shaded pole and series type, Universal, all suitable for 110 V, 60 c/s, and also small d.c. motors; these would be of a type suitable for small fans. Interested firms should communicate with the *Electrical Times*—their letters will be forwarded to Montreal immediately.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

Drilling and Service Ltd., Rex Hse., King William St., E.C.4. To act as agents of all kinds in the oil drilling, mining and allied industries, and to carry on business of manufacturers of drilling components, haulage and electric plant and equipment, etc. Cap.: £100. Dirs.: to be appointed by subs. Subs.: F. H. Gray and F. G. Maw.

Electrical Services (Reigate) Ltd., 64 High St., Reigate, Manufacturers of and dealers in radio, wireless and television, and electrical plant, etc. Cap.: £100. Dirs.: Mrs. A. Levitt and J. Green.

Gradec Ltd., 96 Hackney Rd., Shoreditch, E.2. Manufacturers of and dealers in electric furnaces, electronic, electro-mechanical and electrical apparatus and appliances, etc. Cap.: £150. Pernt. dirs.: A. C. Grant and H. Deco.

Household Electric Appliances (South Wales) Ltd., 117 City Rd., Cardiff. Cap.: £3,000. Dealers n and agents for the sale of refrigerators, etc. Dirs.: E. Nicholas, R. J. Nicholas, L. E. Nicholas and Minnie M. Mountjoy.

S. Loveday and Co., Ltd., 17 Osborne Rd., Pontypool, Mon. Radio, television, telephonic and telegraphic engineers, electrical engineers, etc. Cap.: £2,000. Dirs.: D. J. Loveday and S. J. Loveday, B. Langley and I. H. Tucker.

McCulloch and Newitt Ltd., 42, New Park St., Leeds 1. Electrical engineers and contractors, etc. Cap.: £3,000. Dirs.: H. J. McCulloch, and J. S. Braime.

Midland Auto-electrical Co. (Lichfield) Ltd., Trent Valley Industrial Estate, Burton Road, Lichfield, Staffs. To take over business of automobile electrical repairs, battery service engineers and battery replacements carried on at Birmingham Rd., Lichfield, as Midland Auto-electrical Co. Cap.: £10,000. Dirs.: E. N. Hiskins and Mrs. J. E. Hiskins.

N.E.A.L. Acoustics Ltd., 55 Ely St., Stratford-on-Avon, Warwicks. Manufacturers of and dealers in sound recording, producing, re-producing, amplifying and transmitting machines and instruments, etc. Cap.: £1,000. Dirs.: J. G. Barratt and Mrs. M. Barratt, W. C. M. Hil and F. C. G. Van Baerle. 1

Rotary Electrical Co. Ltd. To take over business of electrical and mechanical engineers carried on at Spring St., Sheffield, by Peter R. Street. Cap.: £5,000. Dir.: P. R. Street.

S. S. Transformers Ltd., 8a Byron Rd., Harrow, Middx. Electrical engineers and contractors, etc. Cap.: £500. Dirs.: G. Howard-Sorrell and L. E. Simmonds.

MEETINGS TO NOTE

THURSDAY, JULY 3

INSTN. OF PRODUCTION ENGRS.—"Machine Control—Use of Comparators for Production." J. D. Richards and R. Yribarren. Royal Empire Society Hall, Craven St., W.C.2, 4 p.m.

TUESDAY, JULY 8

I.E.E. (N. Midland Students Section).—"Design, Performance and Testing of Aircraft." J. C. King. Third Summer Technical Meeting. Y.E.B., Whitehall Rd., Leeds, 6.45 p.m.

LONDON ELECTRIC WIRE AND SMITHS

Record Results

THE forty-third annual general meeting of The London Electric Wire Co. and Smiths, Ltd., was held on June 25 in London.

Mr. W. J. Terry (chairman and managing director), in the course of his speech, said: The total reserves and unappropriated profits now amount to £3,690,007 which is more than two and a half times the total issued capital and constitutes one of the outstanding features of the balance sheet.

Raw Materials

I am pleased to say that there has been some easement during the last few months in respect to supplies of some of the raw materials used in our manufactures but copper, our principal raw commodity, is still much restricted. This shortage has been a great embarrassment because it has meant limiting deliveries to our customers, thus causing them considerable inconvenience and frustration.

It is our opinion, which is generally shared by other consumers both in this country and on the Continent, that the only way to stabilise prices on a world basis is to re-open the London Metal Exchange as soon as can be.

The results of last year's trading constitute a record for this company and I trust will be regarded with satisfaction. To some extent the profits have been increased by inflation and a physical reduction in stocks. In the circumstances, your board felt justified in recommending a bonus of 2½ per cent. in addition to an Ordinary dividend of 10 per cent. for the year. The new £1 Ordinary shares were issued last year at 40s. per share and the return on this issue is therefore 6¼ per cent.

So much has been said about the iniquities of the Excess Profits Levy that it is difficult to say anything new about this obviously ill-conceived and inequitable piece of promised legislation.

The country has suffered many consecutive years of extravagant government expenditure for which the public must foot the bill, a consequence which is not generally understood: nor is the unfortunate plight in which this country finds itself as yet realised by the community. Existing circumstances demand no gentle measures but a bold policy of retrenchment in government expenditure carried through with courage and conviction. It is a misnomer to call this country a "Welfare State" when far more is taken out of the public in taxes than is returned in benefits, and taxation must be drastically reduced in order to restore the required incentive to effort.

The financial strength of the company, as disclosed by the balance sheet, is backed by factories which are well equipped with plant and machinery and operated by loyal employees, prepared to make the best use of all available opportunities and, although the lack of copper supplies has forced us to disappoint some of our customers, the company's goodwill remains very high due to the standard of quality and service which it is our constant endeavour to maintain.

The report was adopted.

FLATS FOR THE BLIND

Right: Worple Lodge (now part of Swail House) and (below) part of the West Wing, South Side.

SWAIL HOUSE EPSOM

A generous bequest by the late Miss Martha Swail has enabled The London Association for the Blind to purchase Worple Lodge (renamed Swail House) and incorporate this in a group of 55 self-contained flats, giving accommodation for 81 persons. Electricity contributes very materially to the comfort and well-being of the blind residents. These flats are the first in the world for registered blind persons, and were designed by Mr. J. B. F. Cowper, F.R.I.B.A.

Electrical Contractors :

BUCHANAN & CURWEN LTD.

WESTMINSTER, BRISTOL & LEATHERHEAD

Wired throughout with **HENLEY CABLES**

BY APPOINTMENT ELECTRIC CABLE MANUFACTURERS

W. T HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53 HATTON GARDEN, LONDON, E.C.1

WESTON
Electrical Measuring Instruments

No. 3 . . . Portable Instruments

Representative of Weston portable instruments, is the Model S.103 — a moving iron type of instrument, designed for a wide range of measurements to first grade accuracy on both A.C. and D.C. The 6" scale is linear over the whole of its working range and a knife-edge pointer and anti-parallax mirror are provided to facilitate accurate reading. The instrument is supplied as a Milliammeter, Ammeter or Voltmeter. Full details of the Model S.103 and of the Model S.82—available in D.C., A.C. rectifier and thermocouple types, are available on request.

SANGAMO WESTON LIMITED

Enfield, Middlesex. *Tel: Enfield 3434 (6 lines) and 1242 (4 lines).* *Grams: Sanwest, Enfield*

Branches:
Glasgow, Manchester, Newcastle-on-Tyne, Leeds, Liverpool, Wolverhampton, Nottingham, Bristol, Southampton, Brighton

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

HASTINGS CORPORATION

TENDERS are invited from electrical contractors for the ELECTRICAL INSTALLATION at the Tivoli Primary Junior School for 320 pupils with additional assembly hall and kitchen. Drawings, specification, etc., can be obtained from the Borough Engineer, 37 Wellington Square, Hastings, on receipt of a deposit of £2 2s. which will be returned on receipt of a bona fide tender and all documents, etc.

Tenders sealed in the envelope provided, are to be returned to the undersigned not later than 2.30 p.m. on Monday, July 28, 1952.

The Council do not undertake to accept the lowest or any tender.

N. P. LESTER,
Town Clerk.
(A 288)

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

GOVERNMENT OF IRAQ

TELEPHONE ENGINEER required for the Posts and Telegraphs Department of the Government of Iraq for one tour of three years in the first instance with possibility of renewal. Salary: Iraq Dinars 150 a month (I.D. 1=£1). Cost of living allowance between I.D. 10 and I.D. 14 a month, according to dependants. Free passages. Liberal leave on full salary. Candidates should preferably be Associate Members of the Institution of Electrical Engineers, or possess similar qualifications and must have had at least 10 years' experience of automatic exchange engineering duties.

Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper to the Crown Agents, 4, Millbank, London, S.W.1, quoting on letter M.28200.A. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration.
(A 289)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

(1) SECTION ENGINEER (Liverpool Central District). Salary £747 p.a., N.J.B. Class "H," Grade 7.
(2) SECTION ENGINEER (Liverpool North District). Salary £704 p.a., N.J.B. Class "G," Grade 7.

Applicants should possess sound experience in construction, operation and maintenance of high voltage systems. H.N.C. in electrical engineering or equivalent desirable.

Appointments superannuable and subject to medical examination.

Application forms obtainable from the Manager, No. 1 Sub-Area, Merseyside and North Wales Electricity Board, 24 Hatton Garden, Liverpool 3. Closing date July 14, 1952. (A 320)

BRITISH ELECTRICITY AUTHORITY
Eastern Division

APPLICATIONS are invited for the following superannuable positions in the Generation (Construction) Department at Divisional Headquarters. Salaries and conditions of service will be in accordance with the National Joint Board Agreement.

(a) SENIOR DRAUGHTSMEN (MECHANICAL)
(b) ENGINEERING DRAUGHTSMEN (MECHANICAL)
(c) ENGINEERING DRAUGHTSMEN (ELECTRICAL)

The commencing salaries (which include London Weighting) will depend upon experience and qualifications but will be within the following ranges:—

(a) Grade 5—£574—£683 per annum,
or Grade 4—£683—£792 per annum.
(b and c) Grade 6—£438—£574 per annum.

Applicants for (a) should be in possession of the Higher National Certificate or equivalent, and for (b) the Ordinary National Certificate. They should be familiar with one or more of the following:

Generation station plant layout and design of pipework, coal, ash and dust-handling systems.

Applicants for (c) should possess the Ordinary National Certificate in Electrical Engineering and have a knowledge of the layout of electrical switchgear E.H.V. sub-station and the preparation of transmission and works power system diagrams.

Applications, stating age, qualifications and experience should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than July 18, 1952.

W. N. C. CLINCH,
Controller.
(A 290)

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts:—

SECOND ASSISTANT ENGINEER (METER TEST)
Birmingham and District Sub-Area.

Extensive experience required in the administration of a Meter Section and the repairing and testing of Meters and Special Instruments. Appropriate technical qualifications necessary. Salary £1,007 to £1,040 (N.J.B. Grade N.7). Apply within 14 days stating age, experience, salary and position to: Emil Braathen, Midlands Electricity Board, 14 Dale End, Birmingham, 4.

THIRD ASSISTANT ENGINEER (CONSTRUCTION)
North Staffs Sub-Area.

Candidates should have construction experience in heavy industrial and rural areas and be able to prepare and check data schedules for overhead lines and substations up to and including 33kV. Technical qualifications desirable. Salary £660 to £685 per annum (N.J.B. Grade J.10). Apply within 14 days stating age, experience, salary and position and endorsed "3rd Assistant Engineer (Construction)" to Mr. H. A. P. Caddell, North Staffs. Sub-Area, 31 Kingsway, Stoke-on-Trent.

A. STEPHENS,
Secretary.
(A 315)

BRITISH ELECTRICITY AUTHORITY
South Western Division

ASSISTANT SHIFT CHARGE ENGINEER required at Newton Abbot Generating Station.

Superannuation Scheme. Salary, N.J.B. Class "F," Grade 9, £587—£609.

Applicants should have good technical qualifications and a sound knowledge of the operation and maintenance of generating plant.

Apply by July 11, 1952, stating age, qualifications, experience, present appointment and salary to R. C. Barrett, Divisional Secretary, 26, Oakfield Road, Bristol, 8.

June 24, 1952. (A 291)

ELECTRICITY SUPPLY COMMISSION (Southern Rhodesia)

VACANCY: TEST ASSISTANT

APPLICATIONS are invited for the above vacancy which exists at the Commission's Test Department, Salisbury.

Technical qualifications: Graduate I.E.E. or equivalent. Approximately 12 years general experience in electrical testing is required. This period does not include apprenticeship, which should preferably have been served in the Testing Department of a large overseas electrical engineering works.

Specific experience required is as follows:—

(1) To be fully conversant with the testing, dry-out and inspection of all types of power and distribution transformers, including on-load tap changing units.
(2) Induction line voltage regulating equipment.
(3) Switchgear of all types.
(4) Condensers.
(5) Alternators and associated equipment.
(6) A.C. and d.c. motors, including control equipment.
(7) Checking and testing h.t. metering cubicles, switchboards and control panels manufactured and assembled at the Commission's workshops.
(8) General knowledge of instruments, meters and associated equipment. Instrument and meter secondary circuits.
(9) All test work involved in commissioning e.h.t. substation equipment, including transmission lines.
(10) The successful applicant would be required to supervise and direct staff placed under his control at any time.

Applicants should be, preferably, within the 30 to 35 years age group. Age limitation may, however, be waived in the event of the applicant's experience and qualifications being suited to the Commission's requirements. Salary scale, £942 by £36 to £1,050 per annum.

The general conditions of service include a contributory pension scheme, medical aid society, holiday fund, 45 days full-pay leave per annum, paid sick leave, child and dependent allowances where applicable. In addition to basic salaries, at present a cost of living allowance of approximately 18% applies. The appointment will be subject to satisfactory medical examination and three months' probationary period.

Applications, giving age, educational and technical training, and subsequent experience in chronological order, nationality, marital state with number and age of dependents, and enclosing copies of testimonials (which will not be returned) should be addressed to the Secretary, Electricity Supply Commission, P.O. Box 377, Salisbury, Southern Rhodesia, so as to arrive not later than July 23, 1952. (A 264)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following superannuable positions. Salary and conditions of service will be in accordance with the National Joint Board Agreement.

JUNIOR ENGINEERS
Rye House Generating Station

Salary N.J.B., Class "G," Grade 16—Grade 14, depending upon qualifications and experience, at present £375 per annum with annual increases to £453 per annum, and thereafter bi-annual increases to £471 per annum.

Duties include experience in the technical operation of electrical, boiler house, and turbine house plant, testing, etc., in a generating station and provide a suitable basis for promotion to higher technical grades.

Preference will be given to applicants who have had previous experience with boiler and turbine plant in a generating station and who have reached the standard of the Ordinary National Certificate in Electrical Engineering or its equivalent.

Applications, stating age, details of qualifications and experience, should be addressed to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than July 12, 1952.

W. N. C. CLINCH,
Controller.
(A 292)

MIDDLESEX COUNTY COUNCIL

County Architect's Dept.

ELECTRICAL ENGINEERING ASSISTANT, Apt. V (£600 to £650 p.a. incl., £10 less if under 26 yrs.). Appointment at grade minimum. Established, pensionable, subject to medical assessment and prescribed conditions. Should have served apprenticeship in wiring installation work, be now employed in designing electrical services for large public buildings and able to work with minimum of supervision.

Application forms from County Architect, 1 Queen Anne's Gate Buildings, Dartmouth Street, S.W.1 (s.a.e. f'cap) to be returned by July 25 (quoting K.939 E.T.). Canvassing disqualifies. (A 336)

SOUTH EASTERN ELECTRICITY BOARD

DISTRICT COMMERCIAL ENGINEER
Purley District.

SALARY £816 to £849 (including London Weighting) under N.J.B. Class "E", Grade 4. Superannuable. Applicants must be experienced in the organisation and control of a Commercial Department, including an installation contracting section and showrooms, and be conversant with tariffs, sales and all aspects of service to domestic and industrial consumers. Corporate membership of I.E.E. or equivalent qualification an advantage.

Applications on forms obtainable from J. McAlister, B.Sc., A.M.I.E.E., Purley Manager, SEEBoard, Electric House, High Street, Purley, and giving 2 referees, must be returned to him through an Employment Exchange, by July 11, 1952.

THIRD ASSISTANT DISTRICT ENGINEER
Lewes District.

Salary in accordance with N.J.B. Schedule, Class "D," Grade 9, commencing at £541 p.a. Superannuable. Candidates to be qualified and have had training in distribution engineering and experience in construction, operation and maintenance of urban and rural systems up to 33 kV. Experience of d.c. to a.c. changeover an advantage.

Applications, giving 2 referees, must reach G. R. Lincoln, A.I.E.E., District Manager, 80 High Street, Lewes, through an Employment Exchange by July 11, 1952.

A. L. BURNELL,
Secretary.
June, 1952. (A 317)

BRITISH ELECTRICITY AUTHORITY

Yorkshire Division

APPLICATIONS are invited for the following appointments:—

POWER STATION SUPERINTENDENT, Kirkstall Power Station. Applicants should have had wide experience in the operation and maintenance of large modern power station plant, including Pulverised Fuel Fired Boilers, and have held a position of responsibility involving the control of technical and administrative staff.

Salary £1,210 to £1,265 p.a. N.J.B. Agreement, Class "H," Grade 1.

ASSISTANT SECTION ENGINEER, Transmission Section, Wakefield. A sound technical education is essential and the possession of technical qualifications will be an advantage. Practical experience in the construction and maintenance of high voltage apparatus is necessary and experience in the operation of such apparatus is desirable.

Salary £564 to £762 p.a. N.J.B. Agreement, Class "AX DX," Grade 6.

Application forms obtainable from Divisional Secretary (Establishments), British Electricity House, St. Mary's Road, Leeds, 7, to be returned within 14 days of the appearance of this advertisement. (A 334)

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

DISTRICT SENIOR COMMERCIAL ASSISTANT
Skye and Lochalsh Area

APPLICATIONS are invited for the position of District Senior Commercial Assistant, Skye and Lochalsh Area, with Headquarters at Main Street, Kyle of Lochalsh.

Candidates should have a sound knowledge of the application of the Board's Tariffs and should be thoroughly capable of interviewing prospective consumers, and the issuing of all types of Quotations and Agreements.

Candidates should also be capable of dealing with consumers' correspondence and statistics and all other matters relating to the consumers' section of the Commercial Department.

Salary and Conditions in accordance with N.J.C., Grade 4—£560 to £620 per annum.

Applications should be addressed to: Area Manager, Skye and Lochalsh Area, Main Street, Kyle of Lochalsh, Ross-shire, marked "CONFIDENTIAL." Full particulars of age, experience, present position and salary should be given. (A 335)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

APPLICATIONS are invited for the superannuable appointment of GENERAL ASSISTANT ENGINEER in the Transmission Department of this Headquarters at a salary in accordance with Grade 8, Class "AX/CX" of the N.J.B. Agreement (£481 to £655 per annum).

Applicants should have experience in high voltage sub-station and overhead line construction work and knowledge of 132 kV equipment will be an added advantage. Applicants must hold the H.N.C. Electrical or equivalent.

Application forms obtainable from the Divisional Secretary at the address below, should be returned by July 17, 1952.

H. J. BENNETT,
Divisional Controller.

British Electricity Authority,
Cardiff (Pengam Moors) Airport,
Cardiff.
June 26, 1952. (A 316)

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable posts. Salaries and conditions in accordance with N.J.B. Agreement, inclusive of London Allowance.

ASSISTANT SHIFT CHARGE ENGINEERS
St. Marylebone Generating Station.

Candidates should have a sound technical training and practical experience in Generating Station operation, particularly with respect to steam generating plant. Schedule "A," Class "E," Grade 9—£585 7s.

ENGINEERING DRAUGHTSMEN
West Ham Generating Station.

Candidates required to undertake general drawing office duties. Schedule "D," Grade 6—£438 to £574 7s.

ENGINEERING DRAUGHTSMEN
Transmission Dept., Divisional H.Q.

Candidates should have received good general education and general Drawing Office experience covering preparation of cable route records, be experienced in surveying of cable routes, and have received training in preparation of substation layouts and site surveying. Schedule "D," Grade 6—£438 to £574 7s.

GENERAL ASSISTANT ENGINEERS
Transmission Dept., Divisional H.Q.

Candidates should possess the Higher National Certificate in Electrical Engineering, or equivalent qualifications, and experience in the operation and maintenance of a high voltage transmission system or a Works training on high voltage switchgear and transformers. Schedule "C," Class "AX/EX," Grade 8—£506 to £728 14s.

Applications stating age, qualifications and experience should be addressed to the Divisional Secretary, B.E.A., London Division, Ergon House, Horseferry Road, S.W.1, to be received within 14 days of this advertisement. (A 318)

THE ELECTRICITY CORPORATION OF NIGERIA

THE ELECTRICITY CORPORATION OF NIGERIA has the following vacancies on its permanent and contract staffs in Nigeria:—

(a) SUPERINTENDING ELECTRICAL ENGINEER. Corporate member I.E.E. plus a degree in engineering, age 35-45. Overseas experience an advantage. Total salary and allowances £1,600 p.a. Probable permanent post.

(b) ELECTRICAL ENGINEERS. Corporate membership I.E.E. Experience in design of thermal and hydro stations and in transmission. Age 28-35. Salaries within range £1,000 to £1,400, according to experience. Permanent posts.

(c) CIVIL ENGINEERS AND JUNIOR CIVIL ENGINEERS, with experience of power station design, thermal and hydro, or good general experience in reinforced and prestressed concrete work. Salaries within range £900 to £1,200 according to qualifications and experience. (These posts are on contract and not pensionable.)

(d) GENERAL ASSISTANT TO COMMERCIAL MANAGER. Preferably electrical/mechanical engineer. Experience in all branches of store replenishment and purchasing, both U.K. and Continental. Total salary £1,100 to £1,250. Possible permanency.

These posts carry excellent conditions of service. Furnished quarters at low rental. Low Income Tax. Tours 18 to 24 months. Liberal leave on full pay. Good prospects in rapidly expanding electrical authority. Forms of application and full particulars from E. C. Inston, Liaison Officer in the United Kingdom, Electricity Corporation of Nigeria, The Corner House, Great Peter Street, London S.W.1. (A 319)

COUNTY BOROUGH OF BLACKPOOL

APPOINTMENT OF A TECHNICAL ASSISTANT

APPLICATIONS are invited for the superannuable appointment of a Technical Assistant—General (A.P.T. III, £500 by £15 to £545) in the Electrical Services Department. The post is subject to special conditions as to office hours, particulars of which may be had on application.

The candidate will be required to prepare constructional drawings, layout plans and other technical work, principally for illuminations and street lighting, and must be a capable draughtsman with knowledge and experience in electrical engineering.

Applications, giving particulars of age, present position, qualifications and experience, including names and addresses of two referees to be forwarded to the Manager, Ministry of Labour and National Service, Queen Street, Blackpool, to reach him not later than July 17, 1952.

Canvassing of, or the submission of the names of, members of Council as referees will disqualify candidates.

TREVOR T. JONES,
Town Clerk.
(A 345)

ASSISTANT ENGINEERS required immediately, preferably experienced in the survey and construction of overhead transmission lines mainly wood pole type. —Give full details of age, education, experience and salary expected to Box No. 870, Keith & Co., Advertising Agents, Edinburgh. (A 260)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

ASSISTANT SWITCHGEAR SALES ENGINEER (Inside) required for London Office of George Ellison, Ltd., 131 Victoria Street, S.W.1. Works experience and some knowledge of office routine essential. Salary according to qualifications, age and experience.—Write to Branch Manager giving details of technical training and experience. (A 337)

BRITISH ELECTRICITY AUTHORITY require ASSISTANT in the Commercial Department at London Headquarters.

Duties will include analysis and co-ordination of statistics relating to electricity sales to industry. Preference given to holders of university degree with some practical experience in statistical investigation.

Appointment, which is superannuable, will be made within N.J.C. Grade 3 (£530 to £590).

Applications, which will be acknowledged, stating age, qualifications, experience, and present post, to D. Moffat, Director of Establishments, British Electricity Authority, Great Portland Street, London W.1, by July 18, 1952. Quote reference AE 266. (A 322)

BRITISH ELECTRICITY AUTHORITY require a SENIOR DRAUGHTSMAN and a DRAUGHTSMAN at Headquarters in London, with experience in reinforced concrete design and detail. Salary, N.J.B. Grade 5, £574 to £684 (for Senior post), and Grade 6, £438 to £574 Pension Scheme.

Applications, which will be acknowledged, should be made on forms obtainable from D. Moffat, Director of Establishments, British Electricity House, Great Portland Street, W.1, by July 28, 1952. Quote reference AE 267. (A 323)

EKCO-ENSIGN ELECTRIC, LTD., Manufacturers of Electric Lamps and Fittings, require a REPRESENTATIVE in the Manchester area. Applicants must have drive and initiative and a good connection with the Electrical and Hardware trades at all levels. Car owner preferred. Remuneration by salary, commission and expenses with pension fund facilities.—Please apply, giving full particulars in first instance, to Northern Area Manager, Kent Street, Preston. (A 308)

ELECTRONICS. Assistant to take charge small lab. dealing with test and development wide range of equipment; must have good technical background and experience.—S.S. Electronics, Ltd., Byron Road, Harrow. (A 293)

FOREMAN to take charge of Electrical Contracting department. Must be capable of planning and estimating for industrial and domestic work, including maintenance.—Simpson Brothers (of Hapton), Ltd., Hapton, Nr. Burnley, Lancs. (A 199)

GRADUATE ELECTRICAL ENGINEER required for Middle East duty by large oil company, to work under desert survey conditions on the investigation, development and application of protective electrical installations for an extensive cathodic protection scheme. Applicants with degree or equivalent, and preferably several years industrial experience, should be single and under 32. Generous allowances in addition to salary, pension fund, paid home leave at two-yearly intervals.—Write, giving full details and quoting No. 210, to Box 5967, c/o Charles Barker & Sons Ltd., 31 Budge Row, London E.C.4. (A 321)

FOSTER
TRANSFORMERS LTD.
South Wimbledon, S.W.19

require

TRANSFORMER DRAUGHTSMEN

ANNUAL bonus in addition to generally recognised pay rates. Good working conditions in modern factory with welfare and canteen services and active Sports and Social Club. Conveniently situated with good tube and bus services.

Apply to the Personnel Officer. (A 296p)

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

JOHNSON AND PHILLIPS, LTD., switchgear works in Johannesburg, South Africa. SENIOR SWITCHGEAR DESIGN AND DEVELOPMENT DRAUGHTSMAN required for power station and control gear ranging from medium to high voltage (11 kV). Only experienced men, not above 35 years of age, need apply.—Reply, stating age, salary and experience to Employment and Welfare Manager, Johnson and Phillips, Ltd., Charlton, S.E.7. (A 188)

LEADING AND SENIOR DRAUGHTSMEN required for Transformer work of the largest class.—Apply by letter quoting "Transformer" and giving full details of age, experience and salary required to Staff Manager, The General Electric Co. Ltd., Witton, Birmingham 6. (A 258)

PIRELLI-GENERAL CABLE WORKS LTD. have Sales Department STAFF VACANCIES for General Correspondence and preparation of Mains Cable Tenders.—Apply in writing to Sales Manager, Eastleigh Works, near Southampton. (A 225)

POWER STATION OPERATING ASSISTANTS required by Kuwait Oil Company for overseas service. Should be G.I.E.E. or G.I.Mech.E. or equivalent and in addition have either full apprenticeship or post graduate training with manufacturers of power plant equipment or experience in a steam power station. Knowledge of mixed pressure plant an advantage. Age 23-30. Salary starting £710 p.a. clear, plus generous allowances, pension scheme and kit allowance.—Write for application form giving personal details and quoting K.1543/4 to Box L/42 at 191 Gresham House, E.C.2. (A 307)

REPRESENTATIVE required on commission basis, by insulating tape manufacturers for London, Midlands and North of England, with good connections among Electrical Engineering manufacturers.—Box No. 1861, Electrical Times. (A 344)

REPRESENTATIVE wanted by well-known electrical wholesaler for Coventry area, to call on factories and contractors. Previous experience essential. Substantial existing connection handed over.—Box No. 1845, Electrical Times. (A 295)

UNIVERSITY COLLEGE, LONDON, requires LECTURER IN ELECTRICAL ENGINEERING, with special reference to electrical machines and heavy current engineering. University graduate with professional qualifications required. Salary range £600 to £1,150 p.a., with family allowance and superannuation; initial salary according to qualifications.—Applications, to be received by July 28, 1952, should be addressed to the Secretary, University College, London, Gower Street, W.C.1, from whom further particulars may be obtained. (A 338)

WORKS FOREMAN required for small electrical engineers and rewinders shop, South Coast district. State experience and salary.—Box No. 1843, Electrical Times. (A 294)

WANTED

A.C.—D.C. MOTORS, STARTERS, complete change-over installations, etc.—A.A. Electrical Co., Ltd., 67 Rothschild Road, Chiswick Park, W.4. Tel.: Chiswick 5105. (A 11)

ALTERNATOR 150-200 K.V.A. 400 V 3-ph. 50 cy. Modern machine only with voltage regulator.—Thomas Ambler, East Ardsley Mills, Wakefield. Tel.: Morley 641. (A 306)

WANTED, ROTARY CONVERTORS, any size.—Universal, 221 City Road, London E.C.1. (A 9)

£50,000

Immediate cash available for purchase of New Ball and Roller Bearings, all types, Steel Balls and Rollers. Top prices paid, small quantities accepted.

CLAUDE RYE BEARINGS

895-921 Fulham Road, London, S.W.6
RENown 6174 (20 lines) (A 328p)

WANTED, Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock Water-tube Boilers. Best prices paid. Prepared to purchase Babcock and Wilcox Water-tube Boilers for dismantling.—Apply, giving full details, to Midland Iron and Hardware Co., Cradley Heath. (A 3)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of secondhand machinery and plant for re-use.—W. and H. Cooper, Ltd., 176 Brady Street, Bethnal Green, E.1. (A 1)

WANTED, D.C. and A.C. ball-bearing MOTORS, MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co., Ltd., 22-26 Britannia Walk, London N.1. (A 7)

WANTED, 50 V direct current MOTORS, complete with starters in good condition of approximately the following rating: 1 No. 25 h.p., 1,000 r.p.m., 2 No. 5 h.p., 800 r.p.m.—Box No. 1853, Electrical Times. (A 327)

WORK WANTED

A.C. and d.c. Motor Rewinds and Repairs. Prompt service, fully guaranteed. Edgware 8631 (4 lines).—Service Electric Co., Ltd., Stanmore, Middx. (A 19)

ARMATURE RE-WINDING SERVICE TO THE TRADE. Vacuums, drills, grinders, hood dryers, dental motors, vacuum cleaner armatures replaced from stock, 24 hours service. Every job guaranteed.—Regam Electric, 95 Park Lane, Leeds 1. (A 213)

CASTINGS. Fisher Foundries, Ltd., Greet, Birmingham, have capacity for brass, gun metal and soft grey iron machine moulded repetition castings weighing 1-30 lb. Loose pattern work up to 3 cwt. Delivery by road to all parts. Tel.: B'ham, Victoria 0197. (A 25)

CONDENSER AND TRANSFORMER CASES. Special boxes and covers. Sheet metal and press-work for the electrical trade. May we quote you? A.I.D. approved.—Conway-Tolhurst Ltd., Airport, Cardiff. (A 326)

FLUORESCENT FITTINGS, SHELLS, etc. Sheet metal work for the electrical and allied trades. Lowest trade prices. Guaranteed quality.—Cowling and Holdsworth, Ltd., Romside Trading Estate, North Street, Romford 7282. (A 191)

WELDING WORK WANTED. Large capacity available in all materials and methods. Keen prices and good workmanship. Difficult jobs our speciality. A.I.D. approved.—Conway-Tolhurst Ltd., Airport, Cardiff. (A 325)

AGENCIES

ELECTRO-MEDICAL AND HOSPITAL EQUIPMENT. London and export agent with efficient staff, well introduced to hospitals, shippers and direct importers overseas requires additional agency of reputable manufacturer.—Box No. 1851, Electrical Times. (A 324)

FOR SALE

CABLES & WIRE

CABLE 7·052 P.B.J. 100,000 yards for sale from stock at well below makers' price, on drums of 5,000 yards.—S. G. Young, 154-6 Blackfriars Road, S.E.1. WATerloo 3131. (A 150)

LARGE Quantity 0·06 4c P.I.L.C.S.W.A. & S. 660V C.M.A. Test Certificates available.—Reply Box No. 1859, Electrical Times. (A 343)

TINNED STEEL ARMATURE BINDING WIRE. All sizes from 14 s.w.g. to 30 s.w.g. supplied in coil or on reels.—Frederick Smith and Co., Wire Manufacturers Ltd., Caledonia Works, Halifax. (A 22)

2,000 YARDS 0·04 four-core P.I.L.C. and S. CABLE: any lengths cut. Immediate delivery.—E. M. Tatton and Co., Ltd., Kew Bridge, Brentford. Eal. 3155. (A 282)

10,000 METRES of 0·014 MOLYBDENUM WIRE. (PROLITE) on reels. What offers?—J. C. Williams, 203 Albany Street, London N.W.1. Euston 4804 (A 332)

ENGINEERING PLANT & MATERIALS

BRASS STRIP, EX STOCK DELIVERY

1½ in. x 21g	½ in. x 22g
1⅛ in. x 26g	⅞ in. x 19g
1⅝ in. x 24g	1¼ in. x 20g
1½ in. x 24g	1½ in. x 20g
1¾ in. x 20g	3⅛ in. x 22g

2s. 6d. lb., or will exchange against your surplus brass and manganese bronze rounds.—Henry Simon (Engineering Works) Ltd., Cheadle Heath, Stockport. (Mr. J. Barnes, Buying Dept.) (A 297p)

APPROXIMATELY 15cwt. of each of following sizes brass rod for sale: 5/32 in., 9/64 in., 1/8 in., 7/64 in., also approximately 2 cwt. 1¼ in. x 0·007 in. sheet brass. Also 728 gross brass and 220 gross plated brass 3 B.A. lock nuts.—Apply C. F. and H. Burton, Progress Works, Bernard St., Walsall. 3960. (A 298)

BRASS RODS BSS. 249

FROM STOCK, MOST SIZES AVAILABLE

from ½ in. - 2 in. dia.

DYAS & FOWLE

41 LOUDON ROAD, LONDON, N.W.8

Telephone: MAIDA VALE 5477, 5489, 8641. (A 21p)

500,000

NEW BALL RACES, ROLLER, THRUST AND TIMKEN RACES IN STOCK. ADVISE REQUIREMENTS.

CLAUDE RYE BEARINGS

895-921 Fulham Road, London, S.W.6
RENown 6174 (20 lines) (A 329p)

COPPER TUBE 2·3/4 in. o/d x 2 in. i/d 1C½ cwt. in lengths 46 in. to 58 in. 2s. 6d. per lb., or exchange against your surplus brass or manganese bronze rounds.—Henry Simon (Engineering Works) Ltd., Cheadle Heath, Stockport. (Mr. J. Barnes, Buying Dept.) (A 310)

2-100 TYPE "Z" No. 10 by ½ in. P.K. Countersunk Slotted Head Screws, cadmium plated.

10,000 Type "Z" No. 10 by 5/16 in. P.K. Screws, round head, cadmium plated.
25,000 6BA x 5/16 in. Countersunk Head Screws, nickel plated brass.
40,000 6BA by 5/16 in. Round Head Screws, nickel plated brass.
10,800 4BA by ½ in. Countersunk Head Screws, nickel plated brass.
15,147 4BA by ⅝ in. Countersunk Head Screws, nickel plated brass.
8,000 4BA Fibre Washers.
25,000 4BA by ½ in. Round Head Screws, cadmium plated brass.
5,000 No. 8 by 5/16 in. Phillips Recessed Countersunk Head type "Z" P.K. screws.
56,275 "J" Black Rubber Grommets, outside diameter 9/16 in., hole diameter 3/16 in.
7,000 Simmonds Spire Speed Nuts, type NJ116.
715 2-way Terminal Blocks (black).
2,400 5-way Terminal Blocks (black).
766 2-way Small Terminal Blocks (brown).
565 E.S. Brass Lampholders.
1,510 Turnbuckles (10 cwt. capacity).
4,000 Toggle Clips.
2,104 Removable Hinge Hooks.
2,410 Removable Hinge Pin Assembly.
233 Brass BC. CG. Lampholders with Shade Ring.
800 Flashed Opal Glass Panels, 16. 1/6 in. by 3·3/4 in., 21 oz. glass.
Box No. 1855, Electrical Times. (A 331p)

PISTOL DRILLS AND SCREW GUNS. High frequency type. 3/16 in. capacity with chucks. 110 V 175 c/s, 2,800 r.p.m.—Wilcox and Co. (B'ham) Ltd., Barr Street, Birmingham 19. Northern 1234/5. (A 309)

DOMESTIC APPLIANCES

IMMERSION HEATERS, GRUBB. A limited number of 4 kW still available in 14 in., 26 in., 28 in., and 30 in., at old prices. Provision for intermediate loadings. Fully guaranteed. Immediate delivery.—Write for terms to Distributors, John Owner and Co., Ltd., Springfield Road, Birmingham 13. Tel.: Springfield 2939. (A 284)

LIGHTING EQUIPMENT

PURLEY CHOKES AND BALLASTS. Our 80 W Tapped h.p.f. Ballast, with Starter Switch-holder incorporated, is proving itself the most popular unit. Suitable for most fittings. 57/6 each, subject.—F. W. Blanshard, Ltd. (Dept. ET), Purley, Surrey. Uplands 4818-9 (A 20)

30 GROSS ¾ in. E.T. BRASS LAMPHOLDERS, Edison screwed fitting.—Apply, S.A.S., Wayne Tank and Pump Co. Ltd., 42 Newlands Park, S.E.26. Tel.: SYD. 7055. (A 300)

GENERATING PLANT

DIESEL PETTER SUPERSCAVENGE 576 B.H.P. Speed 600 r.p.m. with Brush Electric Generator, Switchgear, Fuel tanks, Starting Compressor, etc. A very modern power plant quite complete and in new condition. Seen working Birmingham.—Box No. 1847, Electrical Times. (A 311)

DIESEL GENERATORS

by

HOUCHIN

100 kVA GMC generating plant now available for almost immediate delivery to the home market only.

Incorporating the famous HLD alternator

Details and specification on request from the actual manufacturers:

HOUCHIN LTD.

Garford Works, Garford Street, London, E.14

Tel. East 4123 (5 lines) Grams: Garfodia London (A 33p)

1,500 KW ALTERNATOR by G.E.C., new 1925, wound for 3,300/3/50, 3,000 r.p.m., 0·8 P.F. with direct coupled exciter, air filter, etc.—Burrill, 109 Pencisely Road, Llandaff, Cardiff. Tel.: Llandaff 95. (A 299)

SURPLUS GENERATING GEAR now working.

(1) National gas engine, "VE" type, horizontal single cylinder. 50 b.h.p., 230 r.p.m., output 110 V d.c. at 300 amps., complete with control panel.

(2) National gas engine, "SE" type, horizontal single cylinder. 34 b.h.p., 250 r.p.m., output 110 d.c. at 180 amps., complete with control panel.

(3) Several 110 V d.c. motors, ½ h.p. to 17 h.p.

ALSO AVAILABLE SHORTLY

Bruce Peeble motor converter. Input 3,500 V, 19 amps, 750 r.p.m., 50 cycles, 3 phase. Output 110 V, 100 kW, 910 amp, 750 r.p.m., including starter and control panel.

Apply: Reading Co-operative Society Ltd., Grovelands Road, Reading.

(A 277p)

METERS

A. C./D.C. QUARTERLY and SLOT METERS.—Brent Electrical Co., 6 Holmdale Gardens, N.W.4. (A 8)

HOUSE-SERVICE METERS, a.c. or d.c., quarterly or prepayment.—Universal Electrical, 221 City Road, London, E.C.1. (A 14)

METERS. A.C. and d.c., new and reconditioned, all types. Quarterly, single and 3-phase, 3 and 4-wire, 2½ to 1,000 amp. Prepayment, single and double tariff, single, dual and triple coin, fixed and variable tariff, 2½ to 50 amp. M.D.I., Billiard Switches, Rent Collectors. Prices from 5/-, carriage paid. Guaranteed for ever. Immediate delivery.—Illustrated catalogue from the Electric Meter Company, Castor Road, Brixham. (A 170)

MOTORS & STARTERS

A. A. ELECTRICAL CO. FOR A.C.-D.C. MOTORS, SWITCHGEAR, EXHAUST FANS, HOISTS, REDUCTION GEARS, new, or reconditioned units.—Chiswick 5105, Chiswick 5605, 67 Rothschild Road, W.4. (A 10)

A. C. and D.C. MOTORS, GENERATORS from stock.—Service Electric Co., Ltd., Honeypot Lane, Stanmore, Middx. Edgware 8631-4. (A 13)

A. C. and D.C. MOTORS, GENERATORS, SWITCHGEAR, etc., always in stock. Let me have your inquiries.—G. E. Whittaker, Wellington Mill, Bolton Road, Blackburn. Tel. 7322. (A 6)

A. C. and D.C. MOTORS, all sizes, large stocks. Fully guaranteed.—Milo Engineering Works, Ltd., Milo Road, East Dulwich, S.E.22 (Forest Hill 2278-9). (A 5)

FOR ELECTRICAL MOTORS, GENERATORS, ALTERNATORS, SWITCHGEAR, please send your inquiries to Oldfield Engineering Co., Ltd., 96 East Ordsall Lane, Salford 5. (A 16)

TWO 60 h.p. screen protected slip ring MOTORS by English Electric. 400-440 V, 3 phase, 50 cycles, 970 r.p.m. F.L. speed. Cont. rating. Complete with control gear consisting of English Electric oil immersed ratchet starters and ammeter and 100A isolators.

One 40 h.p. screen protected induction MOTOR by Brook. 400-440 V, 3 phase, 50 cycles, 720 r.p.m. Cont. rating. Control gear by Ellison consisting of combined oil immersed Star Delta starter and isolator with ammeter.

All above motors have been thoroughly reconditioned and are in excellent condition, having been used by us and therefore been very well maintained. They are only being replaced owing to the installation of individual drives.

Apply: Somic, Ltd., Alliance Works, Brindle Street, Preston. Tel. 3011. (A 312)

24 New Brook Flange MOTORS for sale, type R7, squirrel cage, 1 h.p., 1,000 r.p.m., B.B., S. Prot. 400/3/50. 24 as above, type R9, 750 r.p.m.—F. J. Edwards, Ltd., 359, Euston Rd., London, N.W.1. EUSton 4681. (A 339)

220-VOLTS D.C. MOTORS. 175 h.p. GREENWOOD AND BATLEY, for 220 V d.c. Compound interpole, 370 r.p.m., 740 amps.

Three 60/70 h.p. G.E. of America, for 230 V d.c. Drip-proof frames, endshield B/R.B., speed on load variable 1,000 to 1,500 r.p.m. Can be used on supply voltage not exceeding 325 with some increase in horse-power.

50 h.p. E.C.C. for 220 V d.c. shunt wound with interpoles. Speed 1,250/400 r.p.m.

Two 50 h.p. G.E.C., for 220 V d.c. Admiralty standard enclosure. Cont. rated. 1,050 r.p.m.

Six 36 h.p. E.D.C. for 220 V d.c. Compound interpole, cont. rated. Totally enc. 1,850 r.p.m.

Two 35 h.p. B.T.H. for 230 V d.c. Shunt interpole wound, encl. ventilated, fan-cooled. 800 r.p.m. Standard shaft extension.

30 h.p. B.T.H., for 220 V d.c. Compound wound, totally encl., 700 r.p.m.

George Cohen Sons and Co., Ltd., Wood Lane, London W.12. Tel.: Shepherds Bush 2070, and Stanningley, near Leeds. Tel.: Pudsey 2241. (A 301)

All types and sizes of

Industrial Electrical Equipment

ELECTROPOWER COMPANY LIMITED

Kingsbury Works, Kingsbury Road, London N.W.9.
Telephone: COLindale 4621/2. (A 18p)

ELECTRIC MOTORS

THE LOWER THAMES LAND DEVELOPMENT AND CONSTRUCTION COMPANY LTD. have for disposal the following motors. Offers to purchase should be made to the Company, British Electricity House, Great Portland Street, W.1.

Quantity	Size	B.H.P.	Method of starting	Revs.	Slide Rails fitted
3	E.E.6S	7½	D.O.	715	No
2	E.E.7S	10	D.O.	720	No
1	E.F.5W*	15	S.R.	725	Yes
1	E.F.5W	20	S.R.	965	Yes
6	E.H.7W*	15	S.R.	575	Yes
2	G.A.4S	1	D.O.	930	No
1	G.A.5S	3	D.O.	1,430	No
5	G.C.6S	2	D.O.	710	No
7	G.D.6S	3	D.O.	715	No
3	G.D.8S	5	D.O.	715	No

All the above motors are **unused** and of "Laurence Scott" manufacture, totally enclosed, fan-cooled, with single-ended shafts and suitable for operation on a 3-phase, 50 cycle, 400 V supply. All are to B.S.S. 168. Those marked * are slip-ring type, the remainder squirrel cage. Starters and switchgear not available. (A 252p)

SWITCHGEAR

MERCURY SWITCHES are made by Hall Drysdale and Co., Ltd., of 58 Commerce Road, Wood Green, London N.22. Tel.: Bow 7221. (A 15)

400-AMP Capacity UNUSED oil filled draw-out type CIRCUIT BREAKER by Switchgear and Cowans, voltage 6,600/3/50, rupturing capacity 150 MVA, complete with switchboard.—Burrill, 109 Pencisely Road, Llandaff, Cardiff. Tel.: Llandaff 95. (A 302)

TRANSFORMERS & CONVERTORS

FOR SALE a.c.-d.c. RECTIFIER AND TRANSFORMER. Rectifier Makers Hewittic Electric Co., Type 500/6, a.c. Supply 448 V. d.c. output 550 V. 200 kW. Transformer Makers Hackbridge Electrical Construction Company, primary volts 400, primary current 332.—Apply Portsmouth and Brighton United Breweries Ltd., King Street, Southsea. (A 340)

NEVELIN MERCURY ARC RECTIFIER, input Volts, 200-250, single phase, 50 cycles, output: 80/90/100 V. Amps twin 60, as new. Today's price over £400, will accept £75. Seen working, New Central Cinema, Eastbourne. (A 313)

UNCLASSIFIED

FOR SALE. ELECTRIC UNIT HEATERS. 10 15 kW 3 phase, 2 6 kW 1 phase, 4 2 kW 1 phase.—Astoria Gloves Ltd., Caerphilly. (A 330)

FOR SALE: OIL BURNING EQUIPMENT comprising: Oil storage installation of 3 tanks total capacity approx. 8,000 galls., complete with 3-in. dia. interconnection pipes and valves, 2½-in. sludge removal pipes and valves, steam coils in each tank complete with thermostatic valves, condense pipes, steam traps, check valves and bypass valves. One 500 gall., overhead tank complete with steam coil, thermostatic valve, steam trap, valves and pipework. One 400 gall. service tank complete with steam coil, thermostatic valve, steam traps, valves and pipework, also fitted with 9 kW immersion heater and control panel. 1 M.D. oil pump and 1 steam driven pump all suitable for oil burning installation.—Box No. 1857, Electrical Times. (A 342)

FOR SALE. Quantities of High Rupturing Capacity FUSES; MAIN SWITCHES; FUSE BOARDS; STARTERS; MOTORS; CABLES; CONDUIT FITTINGS, etc.—Further particulars may be obtained from The Chief Administrative Officer, Stevenage Development Corporation, Aston House, nr. Stevenage, Herts. (A 341)

THE VAPOR PHASE COOLING SYSTEM fitted to ANY DIESEL or INTERNAL COMBUSTION ENGINE will provide factory heating or process steam, at no cost for fuel, besides lengthening the life of the engine. VAPOR PHASE recovers waste heat as live steam, pays for itself in the first year, costs nothing to operate and is good for life. Send for Leaflet VP 219.—Bastian and Allen, Ltd., Ferndale Terrace, Harrow, Middlesex. HARrow 7171/6. (A 303)

BUSINESSES FOR SALE

FOR SALE due to ill-health. The goodwill of an old-established ELECTRICAL CONTRACTOR'S BUSINESS with extensive turnover and increasing business. Purchaser can take over tenancy of house and sales shop in busy South Lincs. town. Stock optional.—H. H. Morris, F.A.I., 15 Southgate, Sleaford. Tel. 271/2. (A 304)

BUSINESS PREMISES

OLD ESTABLISHED ELECTRICAL PAINTS AND HARDWARE SHOP to let on 10 years' lease. Good agencies. Excellent position in busy shopping centre of good class suburb of Manchester. Owner's other activities necessitate disposal. S.A.V.—Box No. 1849, Electrical Times. (A 314)

MISCELLANEOUS

CITY AND GUILDS (Electrical, etc.) on "No pass—No Fee" terms. Over 95% successes. For full details of modern courses in all branches of Electrical Technology send for our 144-page handbook FREE and post free.—B.I.E.T. (Dept. 39), 17 Stratford Place, London W.1. (A 54)

FREE! Brochure giving details of courses in ELECTRICAL ENGINEERING and ELECTRONICS, covering A.M.Brit.I.R.E., City and Guilds, etc. Train with the Postal Training College operated by an Industrial Organisation. Moderate fees. E.M.I. Institutes, Postal Division, Dept. ET.29, 43 Grove Park Road, London, W.4. (Associate of H.M.V.) (A 305)

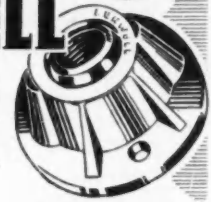
IT IS DESIRED to secure the full commercial development in the United Kingdom of British Patent No. 622,786, which relates to "ELECTRICAL HEATING DEVICES AND METHOD OF MAKING THE SAME," either by way of the grant of licences or otherwise on terms acceptable to the patentee.—Interested parties desiring copies of the patent specifications should apply to Stevens, Langner, Parry and Rollinson, 5 to 9 Quality Court, Chancery Lane, London W.C.2. (A 333)

SAVE YOUR LIGHTS—
FIT
KENWELL
ANTIVIBRATORS

The Kenwell Angle Ball Socket makes every shed roof job a "Piece of cake."

KENWELL

The Kenwell Standard Ball Socket has a self-made reputation for being "just the job."



SMALL PRESSURE DIE CASTINGS (Bacup) Ltd.,
LANEHEAD WORKS, BACUP

ELECTRICITY SUPPLY HANDBOOK

Enlarged 1952 Edition

A comprehensive list of principal officers throughout the supply industry in the United Kingdom, particularly the B.E.A., the Divisions and Area Boards, also the N. of Scotland Hydro-Electric Board. Completely revised up to January 1, 1952. A new feature in this edition is a section giving the **Supply Voltages** of the principal towns and villages in the U.K. Standard domestic tariffs also given.

Price Five Shillings

THE ELECTRICAL TIMES LTD.

Sardinia House, Sardinia Street, Kingsway, London, W.C.2. Telephone: HOLborn 6016

INDEX TO ADVERTISERS

Aerialite, Ltd. 5
Alton Battery Co., Ltd. 75
Aluminium Wire & Cable Co., Ltd. 3
Ashdowns, Ltd. 18
Attwater & Sons 66
Automatic Coil Winder & Electrical Equipment Co., Ltd. ... 15
Automatic Light Controlling Co., Ltd. 72
Automatic Telephone & Electric Co., Ltd. 33
Benjamin Electric, Ltd. 12
Birch, H. A., & Co., Ltd. ... 67
Bray, Geo., & Co., Ltd. 74
British Die Casting & Engineering Co., Ltd. 7
British Electric Resistance Co., Ltd. 28
British Insulated Callender's Cables, Ltd. 17
British Thomson-Houston Co., Ltd. 9, 82
Brook Motors, Ltd. 24
Browning's Electric Co., Ltd. ... 32
Brush Electrical Engineering Co., Ltd. 30
Burco, Ltd. 18
Cable Makers' Association ... 21
Cressall Manufacturing Co., Ltd. 4
Crompton Parkinson, Ltd. ... 11
Downes & Davies, Ltd. 22
Drubel Distributors, Ltd. ... 28
East London Mica Works ... 22
Edwards, F. J., Ltd. 78
Electrical Contractors' Association (Inc.) 32
Electrical Times 59, 78
English Electric Co., Ltd. 43, 65
Eva, Alfred, & Son, Ltd. ... 74
Evershed & Vignoles, Ltd. ... 13
Ferguson Pailin, Ltd. 19
Ferranti, Ltd. 20
Fibreglass, Ltd. 14
Fluxite, Ltd. 10
General Electric Co., Ltd. 1, 48, 50
Gent & Co., Ltd. 77
Glover Stephen & Co. 72
Green, E., & Son, Ltd. 35
Grelco, Ltd. 78
Griffiths, Gilbart Lloyd, & Co., Ltd. 38
Harboro' Rubber Co., Ltd. ... 76
Hardy & Padmore, Ltd. 76
Heatrae, Ltd. 73
Henley's, W. T., Telegraph Works Co., Ltd. 51
Higgs Motors, Ltd. 16
Hivac, Ltd. 4
Horstmann Gear Co., Ltd. ... 70
Igranic Electric Co., Ltd. ... 26
Imperial Chemical Industries, Ltd. 61
Isenthal & Co., Ltd. 66
Ismay Lamps, Ltd. 36
Johnson & Phillips, Ltd. ... 39
Kautex, Ltd. 27
Kelly's Directories, Ltd. ... 60
Lang Pneumatic, Ltd. 4
London Electric Wire Co., and Smiths, Ltd. 8
Low, Duncan, Ltd. 36
Mek-Elek Engineering, Ltd. ... 68
Metafiltration Co., Ltd 64
Metropolitan Electric Cable and Construction Co., Ltd. ... 62
Metropolitan Tool & Products, Ltd. 76
Metway Electrical Industries, Ltd. 40
Midland Electric Manufacturing Co., Ltd. 25
Moss, William, & Sons, Ltd. ... 10
Mudie's Electrical Co., Ltd. ... 42
Nalder Bros. & Thompson, Ltd. 79
National Corrugated Paper Co., Ltd. 41
New Switchgear Construction Co., Ltd. 68
Newton Bros. (Derby), Ltd. ... 70
Parmiter, Hope & Sugden, Ltd. 81
Partridge, Jones & John Paton, Ltd. 45
Partridge Wilson & Co., Ltd. ... 38
Pirelli-General Cable Works, Ltd. 34
Plasticable, Ltd. 74
Powell Duffryn Carbon Products, Ltd. 44
Power Centre Co., Ltd. ... 63
Process Control Gdar, Ltd. ... 74
Reyrolle, A., & Co., Ltd. ... 47
Rowlands Electrical Accessories, Ltd. 6
Rozalex, Ltd. 78
Sanders, Wm., & Co. (Wednesbury), Ltd. 10
Sangamo Weston, Ltd. 52
Santon, Ltd. 69
Saxonia Electrical Wire Co., Ltd. 76
Scott, H. J., & Co. (Belfast), Ltd. 72
Scottish Cables, Ltd. 71
Seal-Less Strapping, Ltd. ... 42
Shell-Mex & B.P., Ltd. 31
Siemens Bros. & Co., Ltd. ... 23
Simmonds & Stokes (Niphan), Ltd. 40
Simplex Electric Co., Ltd. ... 2
Small Pressure Die Castings (Bacup) Ltd. 59
Smart & Brown (Engineers), Ltd. 44
Standard Telephones & Cables, Ltd. 29
Tenaplas (Sales), Ltd. 36
Thorpe, F. W., Ltd. 78
T.M.C.-Harwell (Sales), Ltd. ... 37
Universal Engineering Co. ... 72
Wakefield, C. C., & Co., Ltd. ... 80
Westinghouse Brake & Signal Co., Ltd. 46
Wootton & Co., Ltd. 64

NEW AND COMPLETELY REVISED EDITION NOW READY

LAXTON'S

BUILDERS' PRICE BOOK

FOR 1952

(125th EDITION)

Edited by **P. T. WALTERS, F.R.I.C.S.,** *Chartered Quantity Surveyor*

PRICE 30/- NET

The prices throughout this book offer in a convenient form the means of arriving at rates for the various operations commonly met in connection with normal types of buildings. Prices for work based on wage grades other than "standard wage rates" may readily be adjusted by reference to the percentages given in each group of prices. Similarly, adjustments may be made for variations in prices of materials by using the percentages quoted in each group. There is also a comprehensive list of Brands and Trade Names with names and addresses of makers.

Obtain your copy now from the publishers:

KELLY'S DIRECTORIES LTD.

Established 1799. The Oldest and Largest Directory Publishers in the World

186, STRAND, LONDON, W.C.2 *Tel. No. TEMPLE BAR 3464 (9 lines)*

'Perspex' for Lighting

Measuring the optical properties of 'Perspex'

Measurements of the transmission and reflection factors of opal 'Perspex' acrylic sheet, correctly sampled, ensure the consistent optical properties which are one of the important characteristics of this diffusing material.

'Perspex' is the registered trade mark of the acrylic sheet manufactured by I.C.I.

I.C.I. Service to the Lighting Industry

IMPERIAL CHEMICAL INDUSTRIES LIMITED
LONDON, S.W.1

F.P.5

No. 6

ESSEX BEAUTY SPOTS

The illustration and information are taken from "Journeying into Essex," by W. R. Finch —printed by S. E. Recorders Ltd., Ilford.

CHIPPING ONGAR

ORIGINALLY Roman and later possessing a very fine Elizabethan Mansion. David Livingstone was at one time a student here.

ESSEX is also the home of:

THE METROPOLITAN ELECTRIC CABLE & CONSTRUCTION Co. Ltd.

CLYDE WORKS, CHADWELL HEATH, ESSEX

Tel.: SEVEN KINGS 1810 Grams.: METROCABLE

INDUSTRIAL ELECTRICAL DISTRIBUTION GEAR

BUSBAR TRUNKING IN INDUSTRY—A LARGE TEXTILE FACTORY

The photograph shows an excellent example of a modernised ring room. Note the Busbar Trunking overhead, complete with tap-off fuse boxes, supplying the various motors

Photo by courtesy of The B.I.H. Co. Ltd.

London Office: Wellington House, 125/130 Strand, W.C.2
Telephone Temple Bar 1743

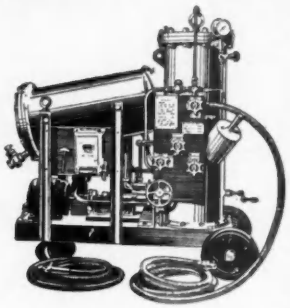
The Power Centre Co. Ltd.

Lloyd Street, Wednesbury

Phone: Wednesbury 0507 Staffs. Grams: "Powcent, Wednesbury

Cold Filtration of Insulating Oils

The insulating value of used transformer and switch oils by one passage through the Metafilter is raised to a higher break-down voltage than the new oil.
The plant is purely mechanical and extremely simple in operation.



Capacities from 20 gallons to 1,000 gallons per hour.

METAFILTRATION

PHONE: HOUNSLOW 1121/2/3
GRAMS: METAFILTER, HOUNSLOW

THE METAFILTRATION COMPANY LIMITED, BELGRAVE ROAD, HOUNSLOW, MIDDLESEX

WOOTTON
METER BOARDS
AND SWITCH BLOCKS

We have been making and supplying the Electrical Industry with METER BOARDS and Switch Blocks for over 27 years

- *FIRST CLASS WORK*
- *QUICK DELIVERIES*
- *COMPETITIVE PRICES*

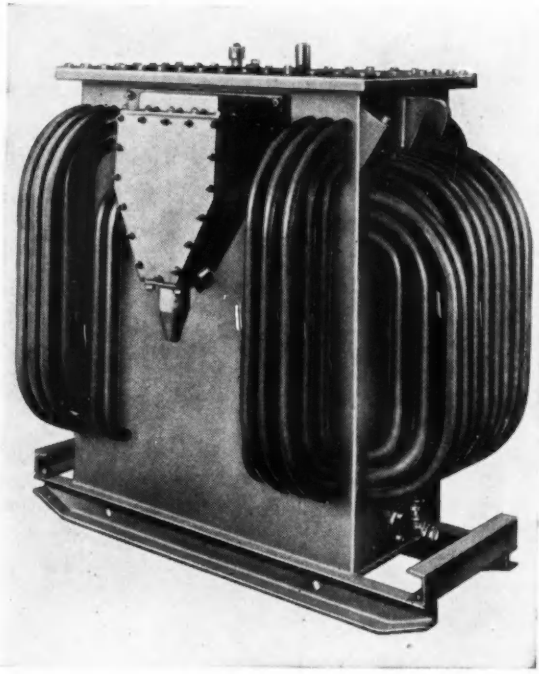
We invite your enquiries

WOOTTON & CO., LTD.
ALMA WORKS, PONDERS END, MIDDLX.
TELEPHONE: HOWARD 1858
L1048A

'ENGLISH ELECTRIC'

transformers

Standard Distribution Transformers for Sub-Stations



The 'ENGLISH ELECTRIC' standard range of distribution transformers includes sub-station transformers with three-phase ratings of 100, 150, 200, 250, 300, 400 and 500 kVA. Standard voltage ratio is 11,000/433 volts; other voltage ratios can be supplied to order, while either tapping links or tapping switches can be provided as required. All transformers can be fitted with a conservator.

'ENGLISH ELECTRIC' ground mounting transformers, one of which is illustrated, are provided with a skid underbase and substantial end channels for haulage and jacking purposes; rollers can also be fitted.

The ENGLISH ELECTRIC Company Limited

QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Transformer Department, Liverpool

Works: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

TL.2

E

ESTABLISHED 1840

ATTWATER & SONS

HOPWOOD STREET MILLS,
PRESTON.

MICA & MICANITE

IN ALL FORMS & QUALITIES.

BAKELITE SHEETS · TUBES · BOBBINS · VARNISH AND ROSIN
FOR OIL SWITCH GEAR & TRANSFORMERS

VULCANISED FIBRE SHEETS, TUBES AND RODS.

PEERLESS **LEATHEROID** INSULATION.

BAKELAQUE INSULATION
WHILE I LIVE I'LL CROW
BEST BRITISH MANUFACTURE
REG^D TRADE MARK

Cotton and also Asbestos Dynamo Tapes.

Presspahn and Fullerboard In Sheets and Rolls.

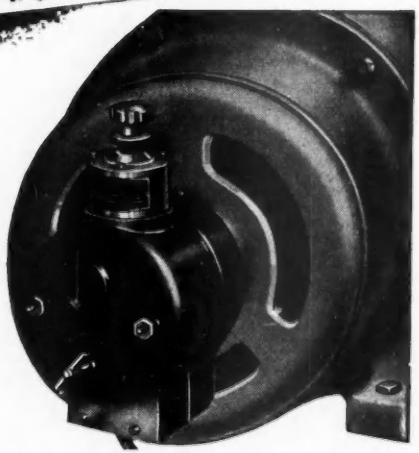
Empire Cloth and Tapes

Ebonite and all Insulating Material for Electrical Engineers.

INSTANTANEOUS REACTION!

ISENTHAL

M.S. AUTOMATIC VOLTAGE REGULATOR



Violent load changes . . . temperature fluctuations . . . wide variations of engine speed . . . the ISENTHAL "M.S." Automatic Voltage Regulator responds *immediately* to such conditions and maintains constant voltage with accuracy and reliability. Easily fitted without special experience, the "M.S." Regulator is remarkably simple and inexpensive to install and maintain.

● **For A.C. or D.C. GENERATORS, BOOSTER SETS, STEAM, DIESEL or HYDRO-ELECTRIC GENERATING PLANTS.**

We will gladly supply full details upon request and our technicians are at your disposal for advice upon your problems

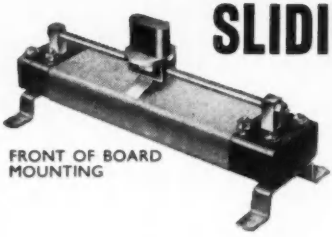
ISENTHAL & CO. LTD. Ducon Works, Victoria Road
NORTH ACTON, LONDON, W.3. *Telegrams : Isenthal, London.* ***Telephone** : ACOrn 3904*

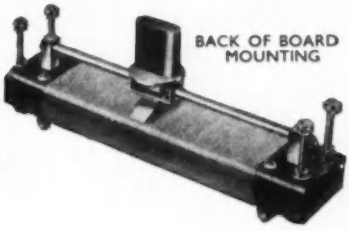
Is1

Birch

Registered Trade Mark

SLATE WOUND SLIDING RESISTORS





SLATE WOUND SLIDING RESISTORS

TUBULAR SLIDING RESISTORS

STUD TYPE RESISTORS

DIMMERS—STUD OR SLIDING TYPES

ASBESTOS WOVEN RESISTOR AND HEATING NETS

LOADING RESISTORS

CARTRIDGE AND STRIP HEATERS

MICA WOUND RESISTORS

PORCELAIN WOUND RESISTORS

STRIP TYPE HEATERS LIST Number H.156

H. A. BIRCH & CO. LTD.

Wilohm Works, Wood Street, Willenhall, Staffs.

Telegrams: "Wilohm," Willenhall · *Telephone* Willenhall 494-495

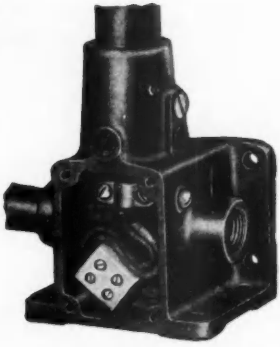
London Office: 33, Sudbury Court Road, Harrow · *Telephone:* ARNold 2694

BR5

MEKELITE

GEARED JOINT

INDUSTRIAL LIGHTING UNITS



Type W2803 can be supplied with 18 in. pillar as illustrated or with short vertical pivot. It is suitable for mounting on horizontal or vertical surfaces, or clamping to vertical tube (1 in. gas). Screwed conduit entries on both sides and clearance hole in bottom with "knock-out." Alternative cover incorporating switch with protection for dolly.

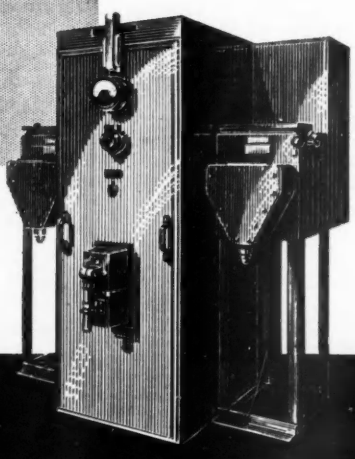
Various lengths of arm (maximum horizontal reach 54 in.). Many other bases and alternative sizes of reflector.

Catalogue sent free on request

MEK-ELEK Engineering Ltd.
17, Western Road, Mitcham, Surrey
Telephone: MITcham 3072 Cables: Mekelek, London

RING-MAIN SWITCHGEAR

150M.V.A at 6·6kV. & 11kV.
400Amp. Oil Immersed Isolator with ON, OFF, EARTH & TEST positions.
Tee-off unit may be of the Draw-out Truck or stationary Cubicle type.



THE NEW SWITCHGEAR CONSTRUCTION CO. LTD.
WELLESLEY ROAD SUTTON SURREY TELEPHONE: VIGILANT 8234

Associated with the Hackbridge & Hewittic Electric Co. Ltd.

Now, at last..

YOU CAN OFFER YOUR CUSTOMERS

Finger-tip control

OF **HOT WATER**

AND **CURRENT**

CONSUMPTION

The **Monmouth** AUTOMATIC ELECTRIC DUAL WATER HEATER *provides*

1 **Quick-service hot water for sinks and basins**—adequate quantities for normal use in a matter of minutes after switching on—or, the thermostatically controlled top-element is kept switched on, **instantaneous hot water whenever required.**

2 **Ample supplies of really hot water for baths, etc.**—20 gallons of steaming hot water, simply by switching over to the lower element whenever you want a bath.

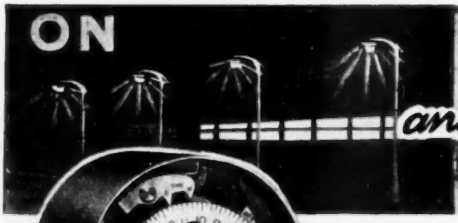
3 **The ability to switch off completely** for periods when no hot water is needed, so that you use NO electricity whatsoever.

—all combined in **one** handsome modern unit, thermally insulated. "Toddler-proof" control switch. Finished in easily cleaned cream enamel in keeping with modern kitchens. The MONMOUTH is easily and cheaply installed, and is made by SANTON.

Two models available: The "MONMOUTH," capacity 20 gallons, 33″ high x 19″ square; The "MONMOUTH JUNIOR," capacity 12 gallons, 27″ high x 17″ square.

Send for full details to: **SANTON LTD., Newport, Mon.** Tel. 71711

22392



You can leave it to

HORSTMANN

for Reliable **TIME SWITCHES**

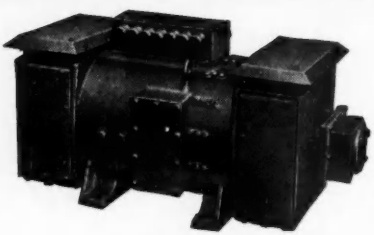
Horstmann Electric Time Switches are renowned for their unfailing reliability. The comprehensive range covers hand wound models (15, 21 and 40 day run), electrically wound and synchronous models with or without spring reserve as required.

May we quote you for your requirements.

GRAMS: HORSTMANN, BATH
TEL: BATH 7241

THE HORSTMANN GEAR CO. LTD.
NEWBRIDGE WORKS • BATH • ENGLAND

NEWTON-DERBY
ELECTRICAL EQUIPMENT



2½ kVA Motor Alternator. Drip-proof to 45°. Motor 220 volts D.C. Output 120 volts, 3 phase, 333 cycles per second. Motor includes an automatic constant-speed governor. Weight 450 lb.

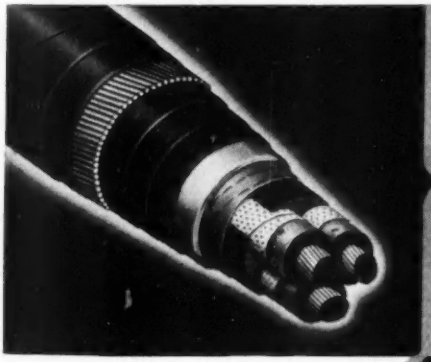
HIGH-FREQUENCY ALTERNATORS

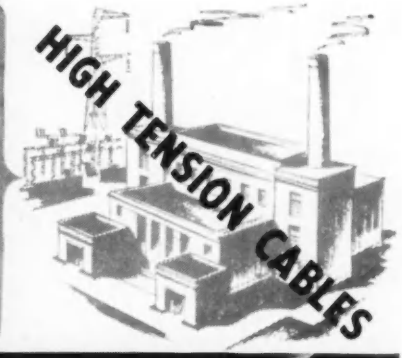
(*Send for publication No.* 1003/2)

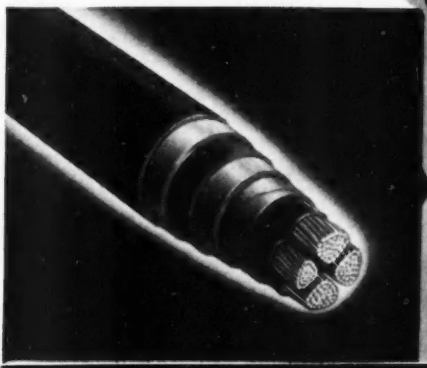
Also makers of Rotary Transformers and Anode Converters, Wind and Engine-driven Aircraft Generators, High-tension D.C. Generators and Automatic Carbon Pile Voltage Regulators.

NEWTON BROTHERS
(DERBY LTD

HEAD OFFICE & WORKS: ALFRETON ROAD, DERBY.
TELEPHONE: DERBY 47676 (3 LINES) TELEGRAMS: DYNAMO, DERBY
LONDON OFFICE: IMPERIAL BUILDINGS, 56 KINGSWAY W.C.2





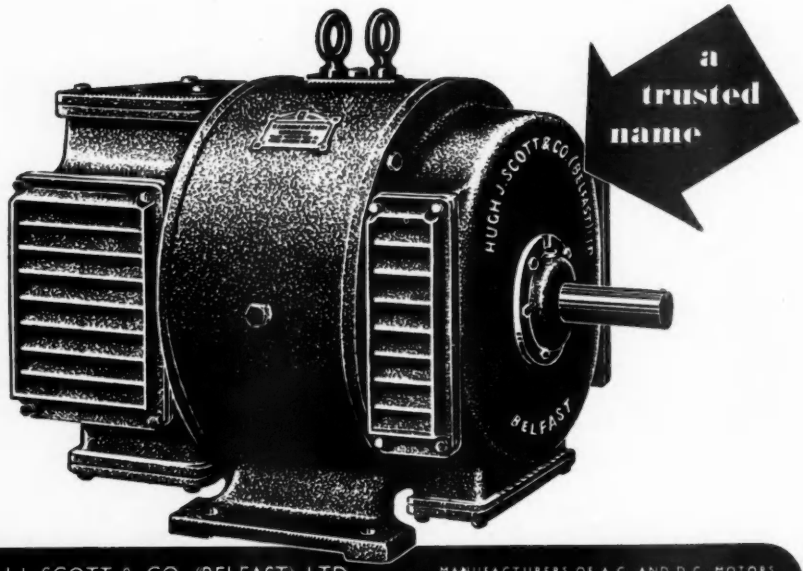


SCOTTISH CABLES LIMITED

DEANSIDE • RENFREW • SCOTLAND

LONDON OFFICE • BUSH HOUSE • ALDWYCH, W.C.2

Associated Company: SCOTTISH CABLES (SOUTH AFRICA) LTD. PIETERMARITZBURG, NATAL

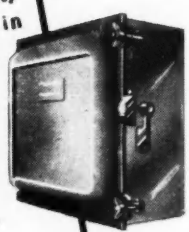


HUGH J. SCOTT & CO. (BELFAST) LTD
VOLT WORKS • BELFAST • N. IRELAND

MANUFACTURERS OF A.C. AND D.C. MOTORS AND GENERATORS UP TO 200 H.P.

WHY NOT REPLACE YOUR CAST IRON SWITCH FUSE & JUNCTION BOXES, Etc., with ALUMINIUM !

Pressure and Gravity Die Castings in Aluminium and Zinc base alloys. Sand castings in Aluminium alloys, Gun Metal, Phosphor Bronze, Brass, etc.



Easier to machine. Rust free. Lighter to handle.

UNIVERSAL
ENGINEERING COMPANY
CASTLE BOULEVARD, NOTTINGHAM
Phone: Nottingham 45631/2
Grams: Lightning, Nottingham
London: CALLARD HOUSE, 74a, REGENT St. Phone: Regent 6170
CASTINGS FOR ALL TRADES

Revised Price List of Galvanised Steel Channelling.

Internal dimensions	Price per Gross 6 ft. lengths
¼ in. x 5/16 in.	£15 0 0
1 in. x 5/16 in.	£18 10 0
13/16 in. x 7/16 in....	£25 0 0
1½ in. x 9/32 in.	£29 0 0
2½ in. x 9/32 in.	£39 0 0

Above prices subject to usual discounts. DELIVERY. Ex-stock or about 7 days, subject to being unsold.
Carriage Paid consignments net value £15 upwards.
STEPHEN GLOVER & CO.
Tudor House, Bridge Street, Walsall.

USE **"GUNFIRE"**
TRADE MARK
Time Switches
AND
Process Timers
FOR SATISFACTION
AUTOMATIC LIGHT CONTROLLING CO. LTD., BOURNEMOUTH
Established over 50 years

Although we are not Astrologers, we make a practice of visualising the actual working conditions of every type of

HEATRAE ELECTRIC WATER HEATER

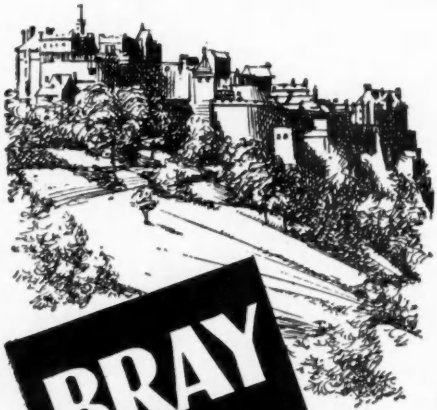
Every design is plotted out on these lines . . . of foreseeing any possible "snags" in subsequent service, and eliminating the possibility of anything going wrong.

That's the keynote of Heatrae success — just that " little more " in scientific design and construction to ensure that " much more " in service through the years.

HEATRAE LTD. • NORWICH

Manufacturers of: Electric Water Heaters, Oil Heaters, Immersion Heaters, Urns, Towel Rails, Airing Cupboard Heaters, Flame-proof Heating Apparatus, Breakfast Cookers, Electric Fires, Food Trolleys, Warming Plates, Air Heaters.

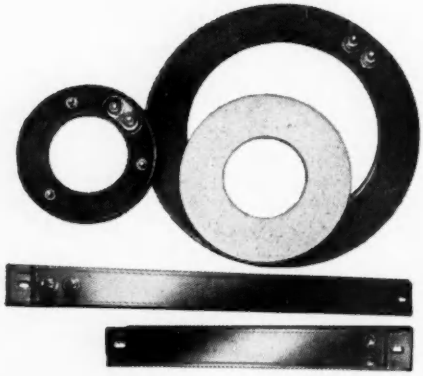
BUILT TO STAND THE TEST OF TIME



BRAY

Edinburgh Castle

CERAMIC EMBEDDED AND METAL CLAD INDUSTRIAL AND DOMESTIC ELECTRIC HEATING ELEMENTS



GEO. BRAY & CO. LTD.

LEICESTER PLACE, LEEDS 2.

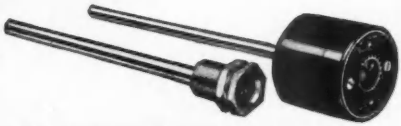
Tel. 20981 (8 lines) **'Grams. "Bray Leeds 2"**

PROSCON

THERMOSTATS

for

AIR & LIQUID TEMPERATURE CONTROL



PROCESS CONTROL GEAR Ltd.
56 Victoria Street, St. Albans, Herts.
ST. ALBANS 2030 PROCONGEAR ST. ALBANS

P.V.C. Sleevings of Quality by *Inter-Service Approval*

Plasticable Ltd

The Extruders

Hawley Lane, Farnborough, Hants

Telephone: Farnborough, Hants 85

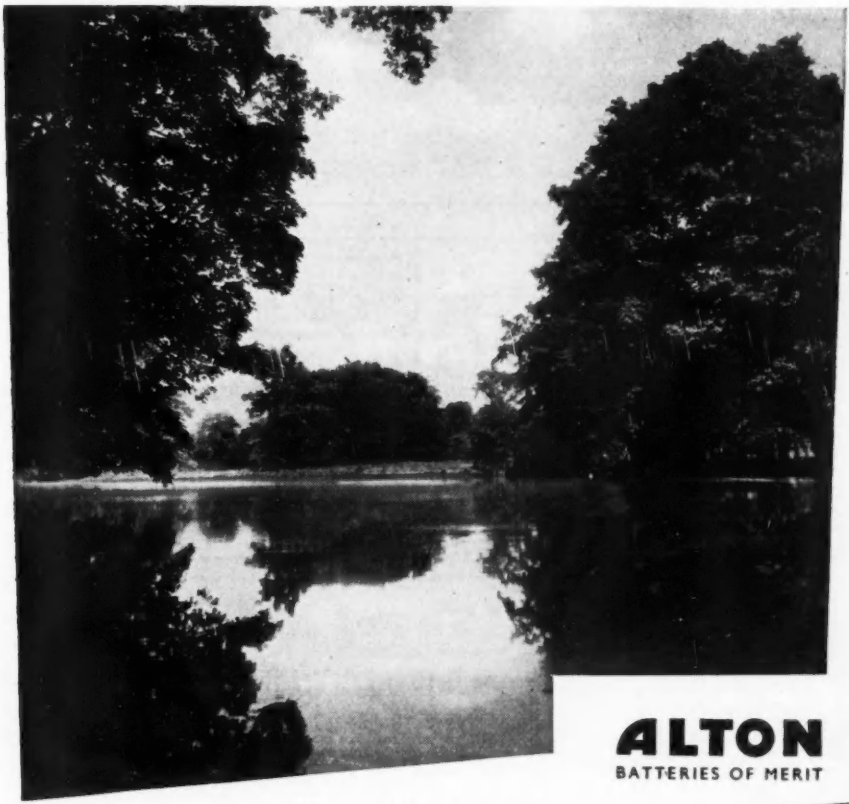
CARTONS AND DISPLAY OUTERS

QUALITY & SERVICE

ALFRED EVA & SON LTD

HARPER ROAD · WYTHENSHAWE · MANCHESTER

Right round the world, men know what Alton means. A storage battery—with a distinctive merit entirely its own. Where can distinction lie, in an era of rigid battery standardisation? One answer is that, in Hampshire, Alton means something else—a little country town. A town with a busy, neighbourly life within its boundaries, and the peace of lovely and unspoilt countryside beyond. A place where the sky is clean and growing things do well: flowers and fruit and children; a woman's pride in the home she makes—a man's in the skills of his trade. Making something better than 'well enough' is a habit that grows strongly in Alton soil. And Alton batteries are made by Alton men.



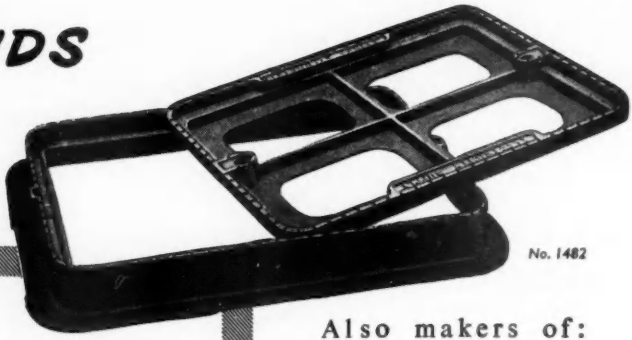
ALTON
BATTERIES OF MERIT

Alton stationary batteries: 10 to 15,000 Ah. Also in regular production, renewal plates for all makes of battery, British and Continental

A25

THE ALTON BATTERY COMPANY LIMITED · Alton · Hants · *Telephone:* Alton 2267 and 2268 · *Telegrams:* Battery, Alton

THOUSANDS have been SOLD...



No. 1482

ROUND CORNERED PAVEMENT COVERS AND FRAMES

16 Standard Sizes

Also makers of: Roadway Covers and Frames · Lamp Pillars and Brackets · Kiosks and Pillar Casings

ESTABLISHED 1814

HARDY & PADMORE LTD., WORCESTER. Tel: WORCESTER 3215

M-W.101

MORE— —THAN FIFTY YEARS

SPECIALISATION IN —
INSULATED ELECTRIC WIRES, CABLES & FLEXIBLE CORDS

The SAXONIA ELECTRICAL WIRE Co. Ltd
ROAN WORKS GREENWICH S.E.10
Phones Greenwich 0463 · 1672 ◆ Grams: Saxonist · London

METOOL

OFFER A PRECISION PRODUCT

Improved designs — fully ball bearing mounted. "METOOL" Self-winding Collector Drums for electric cable and hose.

METROPOLITAN TOOL AND PRODUCTS LTD.
21 Victoria Street, Nottingham, England.
Tel.: Nottingham 43413

Our Technicians study your special needs in

MOULDED RUBBERS

Consult with confidence :

THE HARBORO' RUBBER CO. LTD. MARKET HARBOROUGH

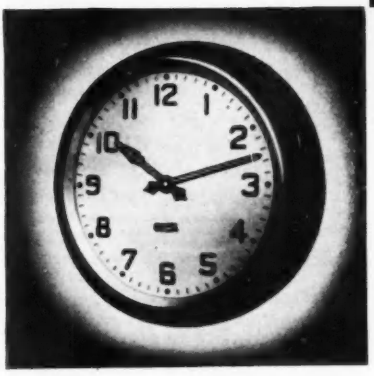
Telephone 2274/5

Power Station Equipment for FREQUENCY CONTROL

Accurate Standard time—as provided by a GENTS' Master Clock—is essential for a correct comparison to be made with Frequency time in all power stations.

THE GENTS' COMPARATOR DIAL, operated from the Master Clock and the frequency supply, shows the loss or gain of Frequency time at any moment. The single, clearly read dial can be calibrated as required to suit all reasonable requirements.

Right: Comparator Dial, available with an 8" or 12" dial for panel mounting.



THE MASTER CLOCK, which is an accurate, precision time-keeping instrument, can also be used for controlling any number or size of "slave" clocks that may be installed in the boiler house gauge panel, turbine room, offices, etc., of the station, and can be fitted to give the half-hourly pulse for operating Printometers. Where impulses are also required for operating workmen's time recorders, the Master Clock can be suitably fitted.

Left: Impulse Slave Clock available in many different sizes and styles, both surface or flush fixing.

In fact, a GENTS' Master Clock can provide all the Standard time throughout the power station.

GENTS' OF LEICESTER

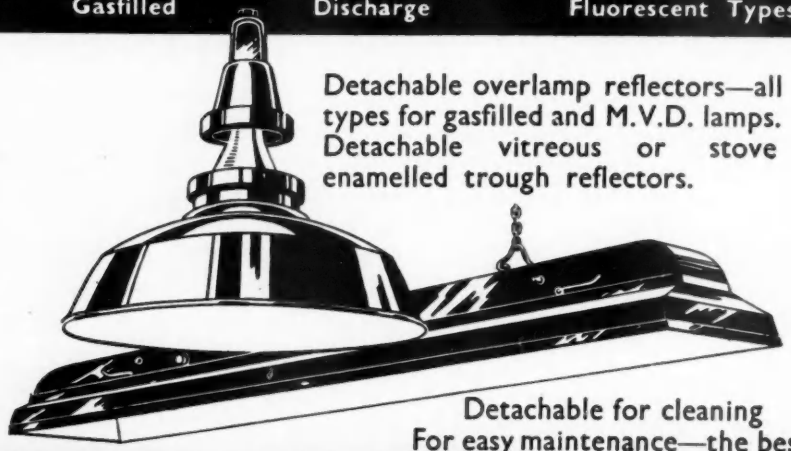
COMPARATOR DIALS AND MASTER CLOCKS

GENT & COMPANY LIMITED, FARADAY WORKS, LEICESTER

47 Victoria Street, London, S.W.1 Tangent House, Leazes Park Road, Newcastle, 1
Winchester House, Victoria Square, Birmingham 2

Other Products: BELLS AND INDICATORS, FIRE AND BURGLAR ALARMS, TELEPHONES, CONTROLLED ELECTRIC CLOCK SYSTEMS, WORKMEN'S TIME RECORDERS, TOWER CLOCKS, PROCESS TIMERS, STAFF LOCATORS, LUMINOUS CALL SYSTEMS, MINE SIGNALLING EQUIPMENT, LIQUID LEVEL CONTROL EQUIPMENT, etc.

THORLUX INDUSTRIAL LIGHTING EQUIPMENT. Manufacturers of Gasfilled Discharge Fluorescent Types



Detachable overlamp reflectors—all types for gasfilled and M.V.D. lamps. Detachable vitreous or stove enamelled trough reflectors.

Detachable for cleaning
For easy maintenance—the best.

F. W. THORPE LTD. WELBY RD HALL GREEN **BIRMINGHAM 28**
SPRINGFIELD 3318 GRAMS: THORLUX B'HAM

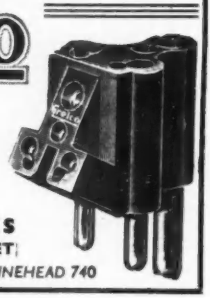
Used
BEFORE WORK
keeps
HANDS HEALTHY
and
CLEAN

ROZALEX
The invisible glove

For new and used machine tools . . . power presses . . . sheet metal working and woodworking machinery, etc. . . . **F.J. EDWARDS, LIMITED**, 359-61, *Euston Road, London, N.W.1. Tel: Euston 4681-3771. 'Grams: Bescotools Norwest London*

INSTRUCTION CHART
For dealing with apparent death from
ELECTRIC SHOCK
(In accordance with H.O. Electy. Reg. 29)
Mounted on strong board, varnished and corded for hanging
Price 3/- plus 11d. postage (per single copy)
ELECTRICAL TIMES
Sardinia House, Sardinia St., LONDON, W.C.2

Grelco
LIMITED
MULTI-PLUG ADAPTORS

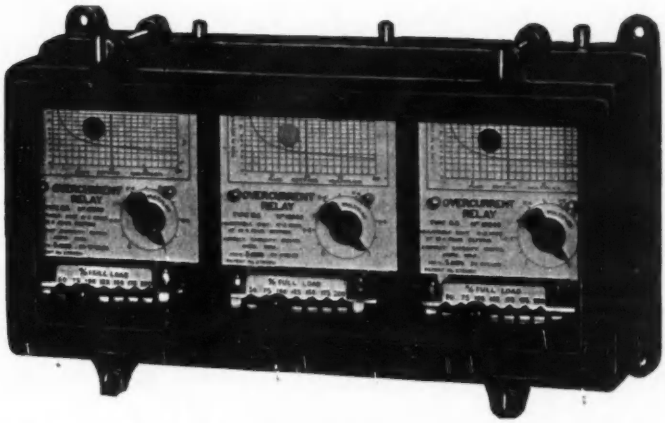


GRELCO WORKS
MINEHEAD, SOMERSET
Telephone and Telegrams: MINEHEAD 740

NALDERS RELAYS

Give full Protection

TYPE 'B·S·L'



CONFORMING to the latest requirements of B.S.142/1942

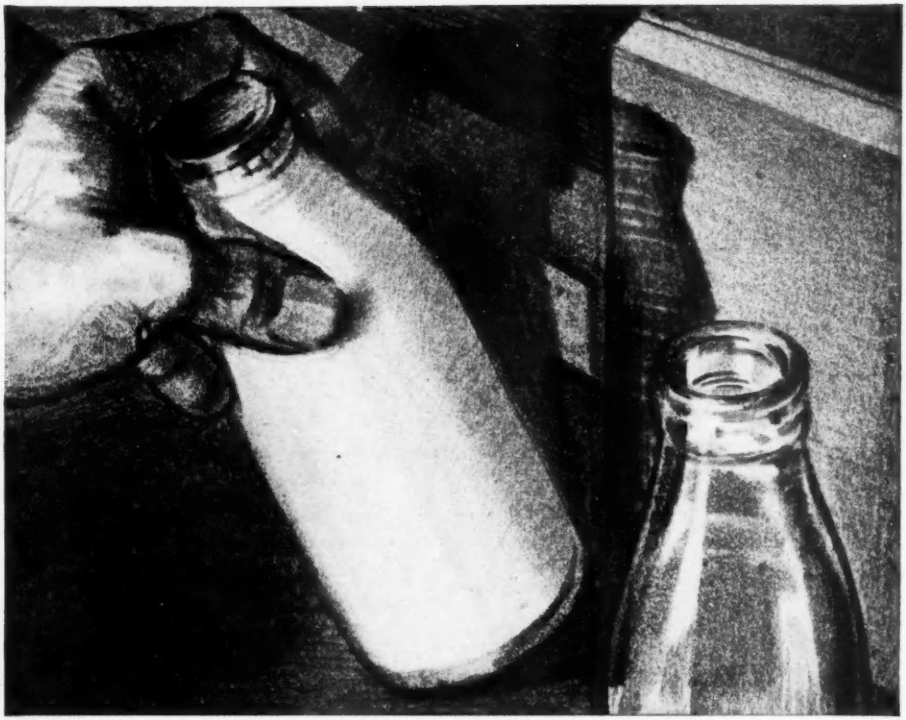
N.C.S. PRODUCTS include Indicating and Recording Instruments of all types including Synchronisers, Vectormeters, Circuit Breakers, etc.

NALDERS RELAYS give full protection to Generators, Transformers, Transmission Line Busbars, Feeders, Meters, etc. They have high torque, low energy consumption, and a wide range of adjustable settings. The Relays are vibration and surge proof, fitted with reliable contacts and operation indicators. The panel space occupied is small. Various types are available in single, double and triple pole patterns for horizontal or vertical mounting.

NALDER BROS. & THOMPSON LTD.

DALSTON LANE WORKS LONDON, E.8.

Telephone: Clissold 2365 (3 lines). Telegrams: Occlude, Hack, London



Efficiency that you take for granted . . .

Look at that pint of milk on your doorstep. What is its butter fat content? Is its calcium content as high as it should be? To what temperatures has it been raised and lowered to kill any lurking bacilli? You don't know. But you take it for granted that your milk is as good as today's scientific food safeguards can make it.

Similarly behind every Wakefield Industrial lubricant lies a long story of scientific achievement. That is why engineers take these oils for granted. They know that the final product that reaches them embodies the sum-total of all lubricating knowledge as it stands today. They know too, from experience, that to use Wakefield Lubricants and enlist the co-operation of the Wakefield Industrial Lubrication Service is one of the surest ways to cut down costs and increase efficiency.

C. C. WAKEFIELD & CO. LTD · GROSVENOR STREET · LONDON · W.1

Printed in England for the Proprietors, THE ELECTRICAL TIMES, LTD., by SUN PRINTERS, LTD., London and Watford, Herts, and published at Sardinia House, Sardinia Street, London W.C.2. July 3, 1952

Aeroflex HOPE'S PATENTS

CERAM

CARTRIDGE FUSE LINKS

Illustrated on the right is an Aeroflex CERAM 400 amp. Fuse Link. These Fuse Links, combining the tried characteristics of previous types with complete interchangeability with other well known makes, have met with ready acceptance. The exceedingly compact dimensions and robust construction render them suitable for the widest range of applications.

60-1000 AMPS
25 MVA BREAKING CAPACITY
1.25 FUSING FACTOR

REWIREABLE INTERCHANGEABLE

The fuse body incorporates multiple elements, and terminals of various lengths may be supplied (see right).

Full details of Aeroflex Ceram Rewireable Fuse Links are given in our latest leaflets.

PARMITER HOPE & SUGDEN LTD.

FLUVENT Electrical Works, Longsight, **MANCHESTER 12**
London : 34 Victoria Street, S.W.1 Glasgow : 162 Buchanan Street, C.1
Birmingham : 39/41 Carrs Lane, 4.

dm PH 46

"Perpetual Daylight"

Interesting Mazda Lighting System for new Brynmawr Rubber factory

AS PART of the development scheme for South Wales, the Board of Trade has sponsored the erection of an important new factory on behalf of Brynmawr Rubber Ltd., a subsidiary of Enfield Cables Ltd. The architects were the Architects Co-operative Partnership.

Daylight streams into this factory through eight circular portlights in each of the ' shell-concrete ' domes, and through four glazed vertical segments in each of the nine bays. After dark, the same sort of lighting had to be provided artificially.

The solution devised by BTH Lighting Engineers is very ingenious and extremely simple. Daylight and artificial light both come from the same direction and are of approximately the same intensity. The fall of night is almost imperceptible.

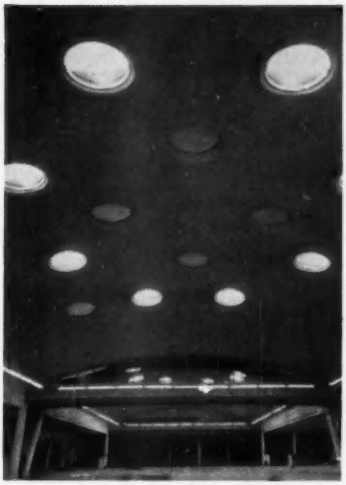
In each of the nine ' shell-concrete ' domes are eight artificial portlights, each with its cruciform arrangement of six Mazda 5 ft., 80-watt Instant Start "Daylight" Fluorescent lamps. Maintenance and relamping are done from above by removing the portlight's spun aluminium lid. This lid is painted white on its underside to act as a reflector.

Daylight from the vertical glazing is simulated by continuous fluorescent troughing suspended about 6 ft. in from the periphery of each bay and at a height of 12 ft. This is supplemented by fluorescent lighting under the soffits formed between the roof spans.

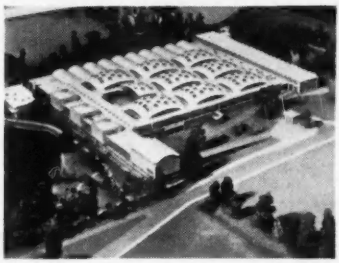
The lighting system in this remarkable factory is a typical example of the way in which the BTH Lighting Advisory Service helps to solve difficult problems.

Mazda lamps stay brighter longer

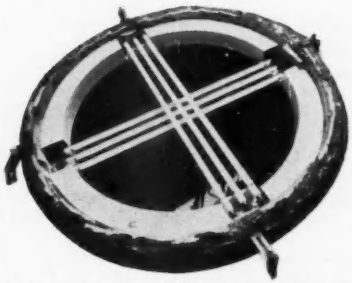
THE BRITISH THOMSON-HOUSTON CO. LTD.
Crown House, Aldwych, London, W.C.2
(*Member of the A.E.I. Group of Companies*) M4386A



Interior night view of one of the nine domes showing the general layout of the daylight and fluorescent portlights, and the fluorescent troughing which simulates the daylight from the vertical glazing just above it.



A model of the factory shown at the South Bank Exhibition. Of the 16 portlights in each ' shell-concrete ' dome, 8 are normal windows, and 8 provide simulated daylight by means of fluorescent lamps.



Exterior view of portlight showing cruciform arrangement of 6 Mazda 80-watt Instant Start " Daylight " Fluorescent Lamps.